Data Visualization: A Practical Approach for Absolute Beginners

Lab 4 – The Future of Data Visualization

Overview

In this lab, you'll create an advanced chart type called a butterfly chart, based off a completely new data set. You'll be combining the methods you've learned in the previous modules to create an advanced combination chart – a PivotTable plus a heatmap, two calculated sets of data and a bar chart plus a column chart.

What You'll Need

To complete the labs, you will need the following:

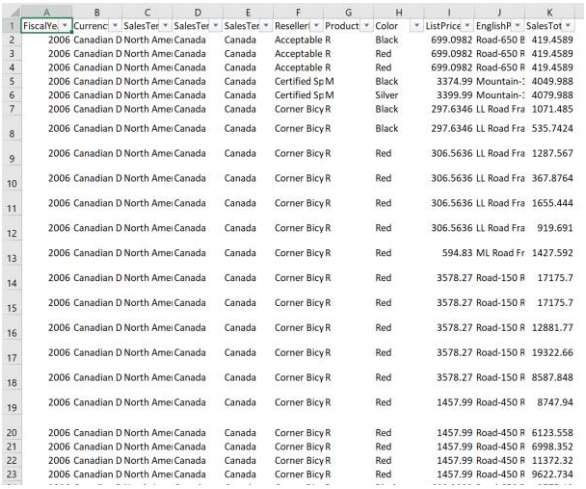
- Desktop version of Microsoft Excel. Instructions for installing Excel are in Module 0 \ Getting Started \ Lab Setup.

Exercise 1: Familiarize Yourself with the New Dataset

In this exercise, you will open the new data set in Excel, and familiarize yourself with its contents

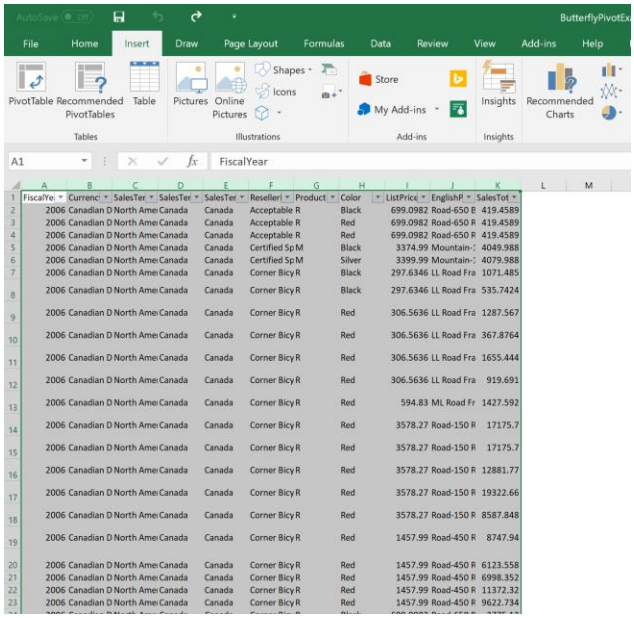
Open the Excel Workbook

1. Open your desktop version of Microsoft Excel.
2. Open the datafile for this lab:
    - It is posted to github.com. Download it from here.
    - ButterflyChartLab_Dataset.xlsx
3. Notice that some of the data is cut off, and hard to read:



	A	B	C	D	E	F	G	H	I	J	K
1	FiscalYe	Currenc	SalesTer	SalesTer	SalesTer	Reseller	Product	Color	ListPrice	EnglishP	SalesTot
2	2006	Canadian D	North Ame	Canada	Canada	Acceptable R		Black	699.0982	Road-650 B	419.4589
3	2006	Canadian D	North Ame	Canada	Canada	Acceptable R		Red	699.0982	Road-650 R	419.4589
4	2006	Canadian D	North Ame	Canada	Canada	Acceptable R		Red	699.0982	Road-650 R	419.4589
5	2006	Canadian D	North Ame	Canada	Canada	Certified Sp	M	Black	3374.99	Mountain-:	4049.988
6	2006	Canadian D	North Ame	Canada	Canada	Certified Sp	M	Silver	3399.99	Mountain-:	4079.988
7	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Black	297.6346	LL Road Fra	1071.485
8	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Black	297.6346	LL Road Fra	535.7424
9	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	306.5636	LL Road Fra	1287.567
10	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	306.5636	LL Road Fra	367.8764
11	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	306.5636	LL Road Fra	1655.444
12	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	306.5636	LL Road Fra	919.691
13	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	594.83	ML Road Fr	1427.592
14	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	3578.27	Road-150 R	17175.7
15	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	3578.27	Road-150 R	17175.7
16	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	3578.27	Road-150 R	12881.77
17	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	3578.27	Road-150 R	19322.66
18	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	3578.27	Road-150 R	8587.848
19	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	1457.99	Road-450 R	8747.94
20	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	1457.99	Road-450 R	6123.558
21	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	1457.99	Road-450 R	6998.352
22	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	1457.99	Road-450 R	11372.32
23	2006	Canadian D	North Ame	Canada	Canada	Corner Bicy	R	Red	1457.99	Road-450 R	9622.734

4. Expand the columns by clicking on “A”, the first column, and hold **Shift;** then move your mouse over to column “K”, and click again, highlighting all columns.



5. Hover over in between any of the columns (for example, between “A” and “B”) and this icon will appear:

6. Double-click when it does, and you can then expand all the columns. You can now familiarize yourself with the dataset:

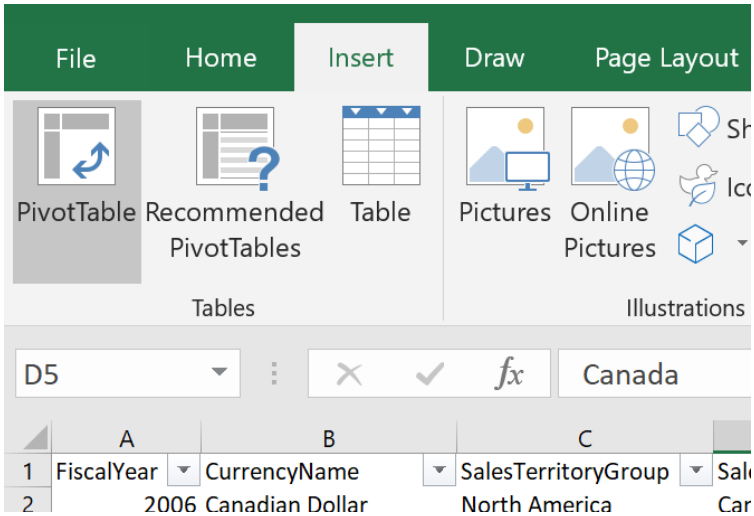
	A	B	C	D	E	F	G	H	I	J	K
1	FiscalYear	CurrencyName	SalesTerritoryGroup	SalesTerritoryCountry	SalesTerritoryRegion	ResellerName	ProductLine	Color	ListPrice	EnglishProductName	SalesTotal
2	2006	Canadian Dollar	North America	Canada	Canada	Acceptable Sales & Service	R	Black	699.0982	Road-650 Black, 52	419.4589
3	2006	Canadian Dollar	North America	Canada	Canada	Acceptable Sales & Service	R	Red	699.0982	Road-650 Red, 44	419.4589
4	2006	Canadian Dollar	North America	Canada	Canada	Acceptable Sales & Service	R	Red	699.0982	Road-650 Red, 62	419.4589
5	2006	Canadian Dollar	North America	Canada	Canada	Certified Sports Supply	M	Black	3374.99	Mountain-100 Black, 38	4049.988
6	2006	Canadian Dollar	North America	Canada	Canada	Certified Sports Supply	M	Silver	3399.99	Mountain-100 Silver, 38	4079.988
7	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Black	297.6346	LL Road Frame - Black, 52	1071.4848
8	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Black	297.6346	LL Road Frame - Black, 58	535.7424
9	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	306.5636	LL Road Frame - Red, 44	1287.5674
10	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	306.5636	LL Road Frame - Red, 48	367.8764
11	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	306.5636	LL Road Frame - Red, 60	1655.4438
12	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	306.5636	LL Road Frame - Red, 62	919.691
13	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	594.83	ML Road Frame - Red, 48	1427.592
14	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	3578.27	Road-150 Red, 44	17175.696
15	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	3578.27	Road-150 Red, 48	17175.696
16	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	3578.27	Road-150 Red, 52	12881.772
17	2006	Canadian Dollar	North America	Canada	Canada	Corner Bicycle Supply	R	Red	3578.27	Road-150 Red, 56	19322.658

Exercise 2: Create a PivotTable

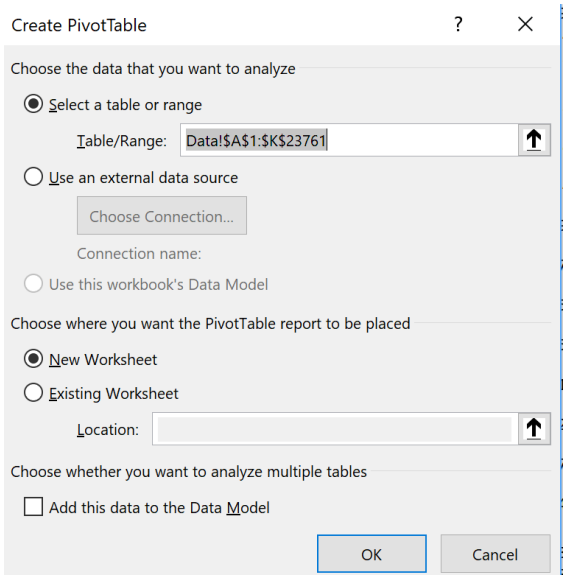
In this exercise, you will create a pivot table as well as format it to work with the butterfly chart format.

Pivot your data

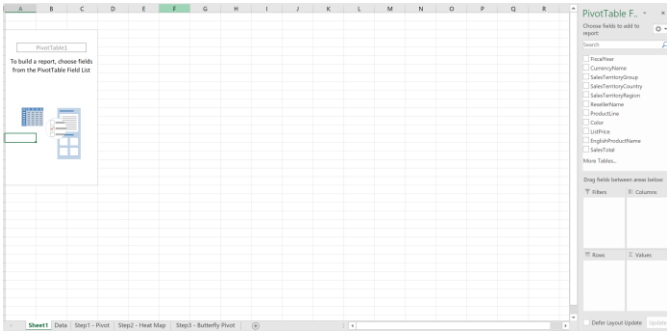
1. Click on any cell within the table of data
2. On the Insert ribbon, click **PivotTable** in the top-left area of the Excel ribbon above to create a PivotTable.



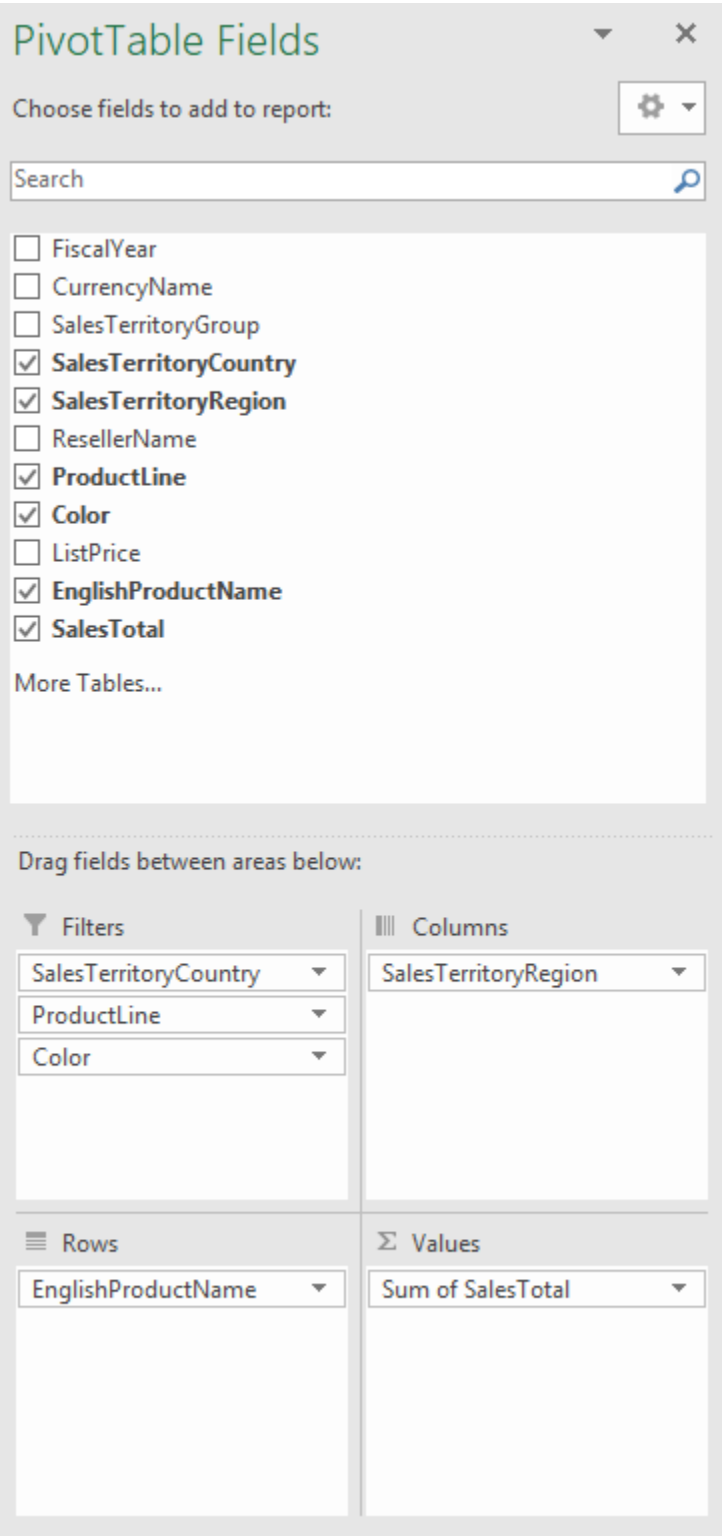
You'll want to create it in a new worksheet:



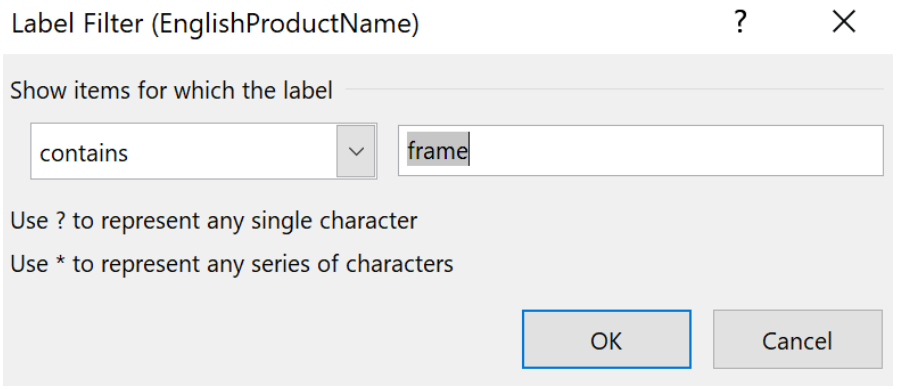
You should see a blank worksheet with an empty PivotTable, like this:



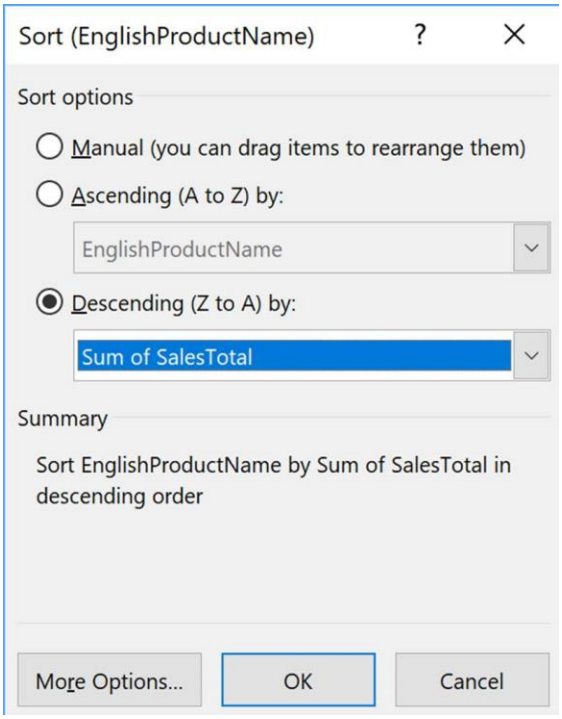
3. Next, add the following fields to your new PivotTable from your dataset, and move them to the Filters, Columns, Rows, and Data areas:



4. Filter the list of Products to include only products with the word “frame” in the name. To do this:
    a) Click the dropdown box for “Row Labels” (cell A6)
    b) Click **Label Filters** to add a filter where the Product Name contains the word “frame”



5. In the Filters section of your PivotTable (which will be in cell A1 unless you moved your PivotTable), set the Filters for the fields with these values:
    a) SalesTerritoryCountry = “United States”
    b) ProductLine = “M”
    c) Color = “Black”
6. Sort the columns and rows in reverse alphabetical order by clicking the dropdown box in cell B5 called **Column Labels**, and A6 called **Row Labels**, and selecting “Descending (Z to A)”
7. Add another sort on **Row Labels** by clicking **More Sort Options** to sort the SalesTotal in descending order. Repeat step 7 for Column Labels.



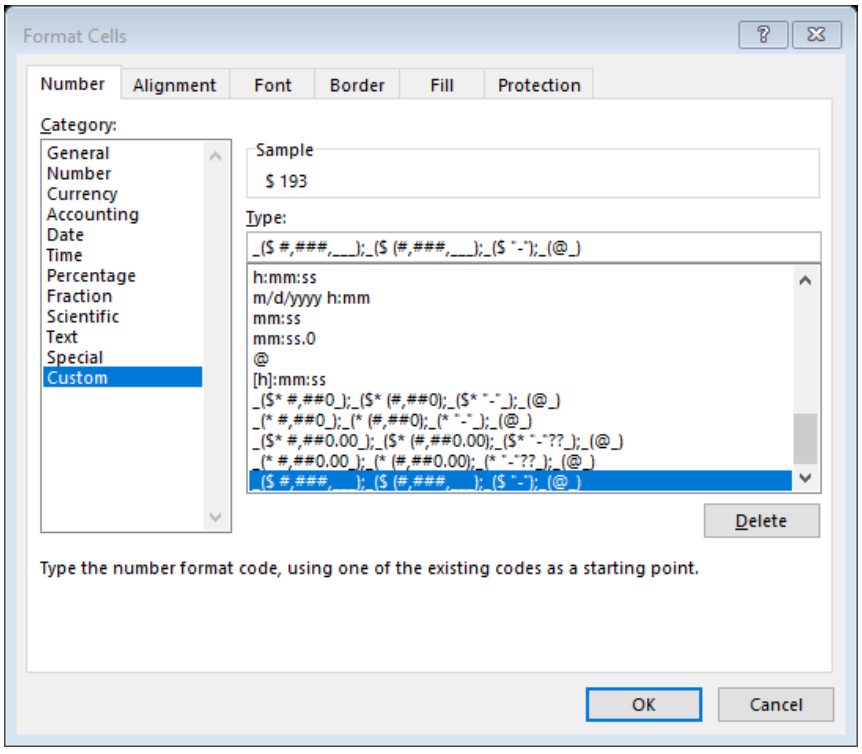
8. In this step, we’ll format the sales data in the PivotTable to show as currency and as a custom number that shows sales values as thousand dollar units.
    a) Select the range of cells that have numeric values, including the Grand Total row and column

	A	B	C	D	E	F	G
1	SalesTerritoryCountry	United States					
2	ProductLine	M					
3	Color	Black					
4							
5	**Sum of SalesTotal**	**Column Labels**					
6	**Row Labels**	**Southwest**	**Southeast**	**Northwest**	**Northeast**	**Central**	**Grand Total**
7	HL Mountain Frame - Black, 42	193003.0495	62159.2654	186516.3903	65516.948	92724.3111	599919.9643
8	HL Mountain Frame - Black, 38	129906.0906	31863.6624	99030.862	31359.7975	40261.4392	332421.8517
9	ML Mountain Frame - Black, 48	48756.648	12346.104	32071.1326	25529.232	17786.76	136489.8766
10	ML Mountain Frame - Black, 44	35364.264	7323.96	20507.088	15903.456	10044.288	89143.056
11	HL Mountain Frame - Black, 48	18624.48	23483.04	26722.08		15385.44	84215.04
12	ML Mountain Frame - Black, 38	27621.792	9416.52	20925.6	11927.592	8998.008	78889.512
13	LL Mountain Frame - Black, 44	18434.502	6594.456	20296.037	5395.464	10491.18	61211.639
14	LL Mountain Frame - Black, 42	11240.55	4945.842	12289.668	4496.22	5395.464	38367.744
15	LL Mountain Frame - Black, 48	10641.054	3297.228	11989.92	4196.472	5994.96	36119.634
16	HL Mountain Frame - Black, 44		4048.8	4858.56		1619.52	10526.88
17	ML Mountain Frame - Black, 40	4185.12	418.512	2301.816	837.024	418.512	8160.984
18	LL Mountain Frame - Black, 52	749.37	149.874	449.622	149.874	299.748	1798.488
19	LL Mountain Frame - Black, 40	149.874	449.622	299.748	149.874		1049.118
20	**Grand Total**	**498676.7941**	**166496.8858**	**438258.5239**	**165461.9535**	**209419.6303**	**1478313.788**

b) On the Home ribbon in Excel, click to expand the dropdown box for the Number format and select Custom to open the Format Cells window.

c) Select the Custom format, and then type over the word General to enter this custom format:

```
_($ #,###,___);_($ (#,###,___);_($ "-");_(@_)
```



After you apply the custom format, your PivotTable should resemble the following:

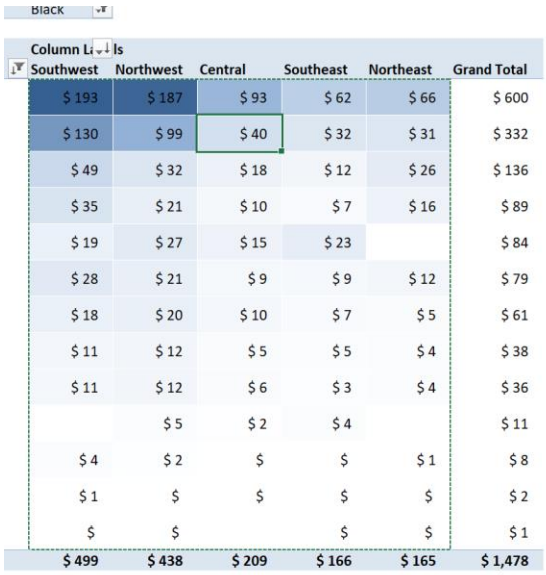
	A	B	C	D	E	F	G
1	SalesTerritoryCountry	United States					
2	ProductLine	M					
3	Color	Black					
4							
5	**Sum of SalesTotal**	**Column Labels**					
6	**Row Labels**	**Southwest**	**Southeast**	**Northwest**	**Northeast**	**Central**	**Grand Total**
7	HL Mountain Frame - Black, 42	$193	$62	$187	$66	$93	$600
8	HL Mountain Frame - Black, 38	$130	$32	$99	$31	$40	$332
9	ML Mountain Frame - Black, 48	$49	$12	$32	$26	$18	$136
10	ML Mountain Frame - Black, 44	$35	$7	$21	$16	$10	$89
11	HL Mountain Frame - Black, 48	$19	$23	$27		$15	$84
12	ML Mountain Frame - Black, 38	$28	$9	$21	$12	$9	$79
13	LL Mountain Frame - Black, 44	$18	$7	$20	$5	$10	$61
14	LL Mountain Frame - Black, 42	$11	$5	$12	$4	$5	$38
15	LL Mountain Frame - Black, 48	$11	$3	$12	$4	$6	$36
16	HL Mountain Frame - Black, 44		$4	$5		$2	$11
17	ML Mountain Frame - Black, 40	$4	$	$2	$1	$	$8
18	LL Mountain Frame - Black, 52	$1	$	$	$	$	$2
19	LL Mountain Frame - Black, 40	$	$	$	$		$1
20	**Grand Total**	**$499**	**$166**	**$438**	**$165**	**$209**	**$1,478**

Exercise 3: Add a Heatmap to Your Pivot Table

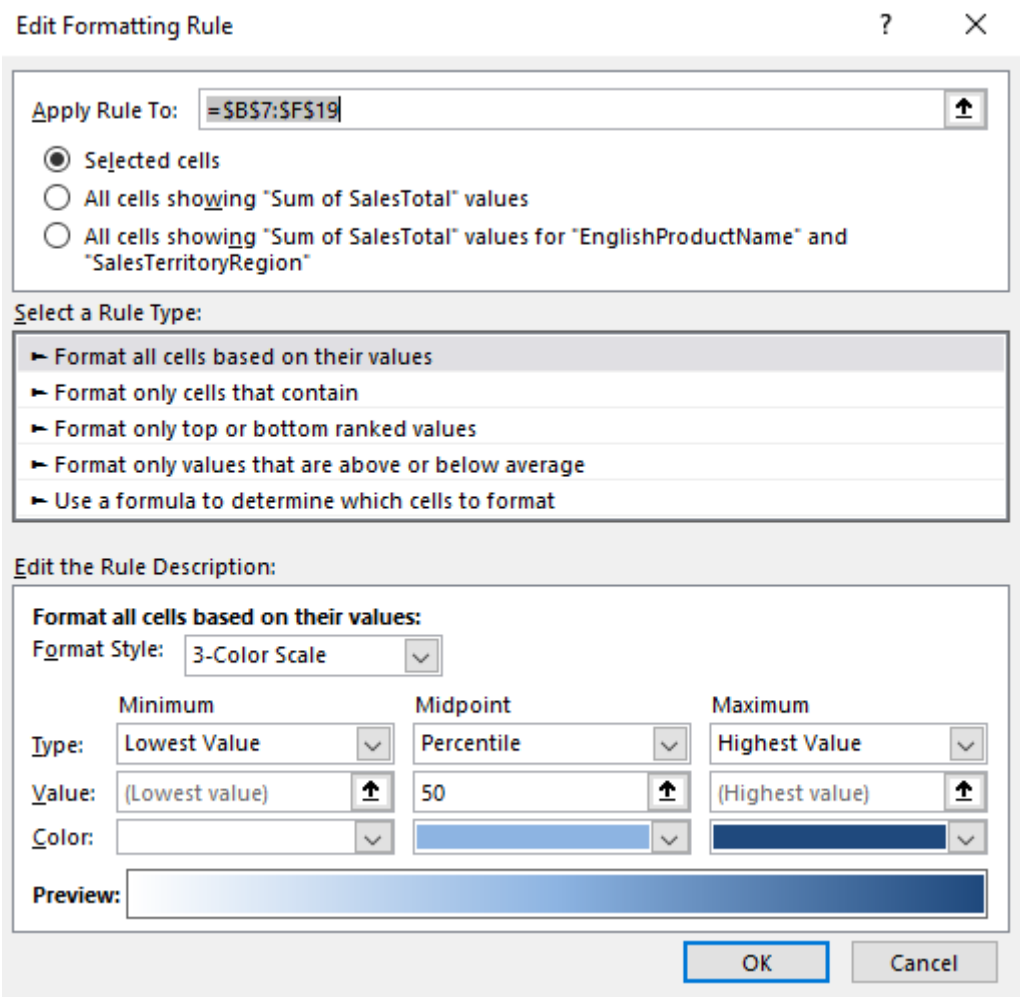
In this exercise, you will add a heatmap to your pivot table.

Apply Conditional Formatting to the Pivot Table

1. Apply the following Conditional Formatting rules to the range that **does not include** the grand totals (see image below) – **HINT** Adjust your rule's range to fit your PivotTable; cell references may be different than what you see here.



Black					
Column Labels					
Southwest	Northwest	Central	Southeast	Northeast	Grand Total
$193	$187	$93	$62	$66	$600
$130	$99	$40	$32	$31	$332
$49	$32	$18	$12	$26	$136
$35	$21	$10	$7	$16	$89
$19	$27	$15	$23		$84
$28	$21	$9	$9	$12	$79
$18	$20	$10	$7	$5	$61
$11	$12	$5	$5	$4	$38
$11	$12	$6	$3	$4	$36
	$5	$2	$4		$11
$4	$2	$	$	$1	$8
$1	$	$	$	$	$2
$	$		$	$	$1
$499	$438	$209	$166	$165	$1,478



Sum of SalesTotal Row Labels	Column L…ls Southwest	Northwest	Central	Southeast	Northeast	Grand Total
HL Mountain Frame - Black, 42	$ 193	$ 187	$ 93	$ 62	$ 66	$ 600
HL Mountain Frame - Black, 38	$ 130	$ 99	$ 40	$ 32	$ 31	$ 332
ML Mountain Frame - Black, 48	$ 49	$ 32	$ 18	$ 12	$ 26	$ 136
ML Mountain Frame - Black, 44	$ 35	$ 21	$ 10	$ 7	$ 16	$ 89
HL Mountain Frame - Black, 48	$ 19	$ 27	$ 15	$ 23		$ 84
ML Mountain Frame - Black, 38	$ 28	$ 21	$ 9	$ 9	$ 12	$ 79
LL Mountain Frame - Black, 44	$ 18	$ 20	$ 10	$ 7	$ 5	$ 61
LL Mountain Frame - Black, 42	$ 11	$ 12	$ 5	$ 5	$ 4	$ 38
LL Mountain Frame - Black, 48	$ 11	$ 12	$ 6	$ 3	$ 4	$ 36
HL Mountain Frame - Black, 44		$ 5	$ 2	$ 4		$ 11
ML Mountain Frame - Black, 40	$ 4	$ 2	$	$	$ 1	$ 8
LL Mountain Frame - Black, 52	$ 1	$	$	$	$	$ 2
LL Mountain Frame - Black, 40	$	$		$	$	$ 1
Grand Total	**$ 499**	**$ 438**	**$ 209**	**$ 166**	**$ 165**	**$ 1,478**

Exercise 4: Turn Your Pivot-Heatmap into a Butterfly Combo Chart

In this exercise, you will add calculations, a bar chart, and a column chart, to your pivot chart to create a Butterfly Diagram.

Calculate Percentages for Bar Charts and Column Charts

1. Create a calculation for each "Grand Total" cell in every row for your pivot table
   NOTE: you'll have to do these calculations one by one, for a total of 13 (thirteen) calculations.

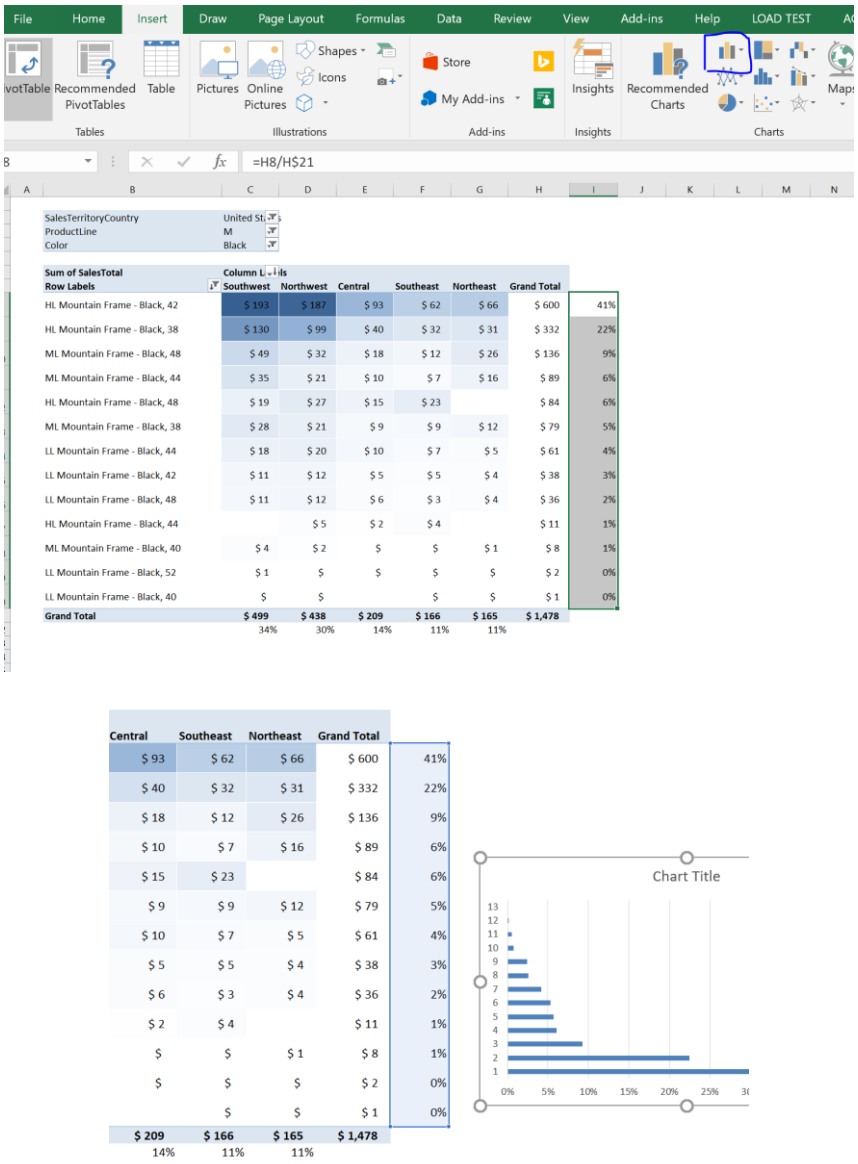
   Your new column should calculate the percentage of the grand total for each row, or Row's Grand Total / The Grand Total Sum. Format your new values as a percentage.

	Column L…ls						
	Southwest	Northwest	Central	Southeast	Northeast	Grand Total	
ne - Black, 42	$ 193	$ 187	$ 93	$ 62	$ 66	$ 600	41%
ne - Black, 38	$ 130	$ 99	$ 40	$ 32	$ 31	$ 332	22%
ne - Black, 48	$ 49	$ 32	$ 18	$ 12	$ 26	$ 136	9%
ne - Black, 44	$ 35	$ 21	$ 10	$ 7	$ 16	$ 89	=H11/H$21
ne - Black, 48	$ 19	$ 27	$ 15	$ 23		$ 84	6%
ne - Black, 38	$ 28	$ 21	$ 9	$ 9	$ 12	$ 79	5%
ne - Black, 44	$ 18	$ 20	$ 10	$ 7	$ 5	$ 61	4%
ne - Black, 42	$ 11	$ 12	$ 5	$ 5	$ 4	$ 38	3%
ne - Black, 48	$ 11	$ 12	$ 6	$ 3	$ 4	$ 36	2%
ne - Black, 44		$ 5	$ 2	$ 4		$ 11	1%
ne - Black, 40	$ 4	$ 2	$	$	$ 1	$ 8	1%
ne - Black, 52	$ 1	$	$	$	$	$ 2	0%
ne - Black, 40	$	$		$	$	$ 1	0%
	$ 499	**$ 438**	**$ 209**	**$ 166**	**$ 165**	**$ 1,478**	

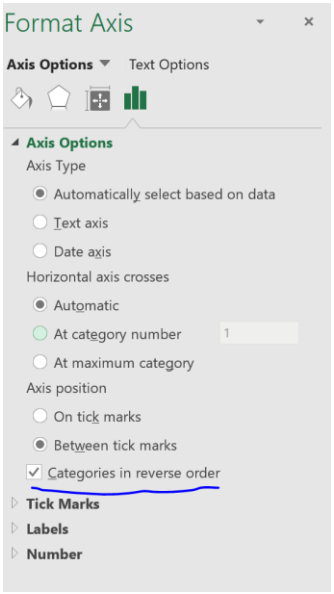
2. Repeat the exercise for the column grand totals, for a total of 5 (five) individual calculations.

HL Mountain Frame - Black, 44		$ 5	$ 2	$ 4		$ 11	1%
ML Mountain Frame - Black, 40	$ 4	$ 2	$	$	$ 1	$ 8	1%
LL Mountain Frame - Black, 52	$ 1	$	$	$	$	$ 2	0%
LL Mountain Frame - Black, 40	$	$		$	$	$ 1	0%
Grand Total	**$ 499**	**$ 438**	**$ 209**	**$ 166**	**$ 165**	**$ 1,478**	
	34%	30%	14%	=F21/$H21	11%		

3. Select the calculation range and create your bar chart

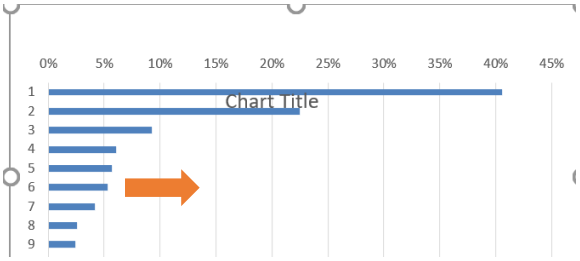


4. The formatting of your bar chart will not be ready to be a butterfly wing; for formatting properly, do the following
    a) Right-click the “Y” axis, click **Format Axis**, and reverse the category order:

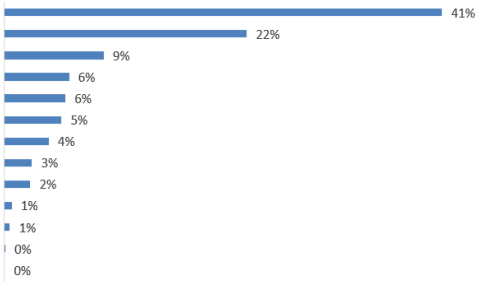


b) Delete the chart title

c) Click on one of the vertical chart lines, and press “Delete”

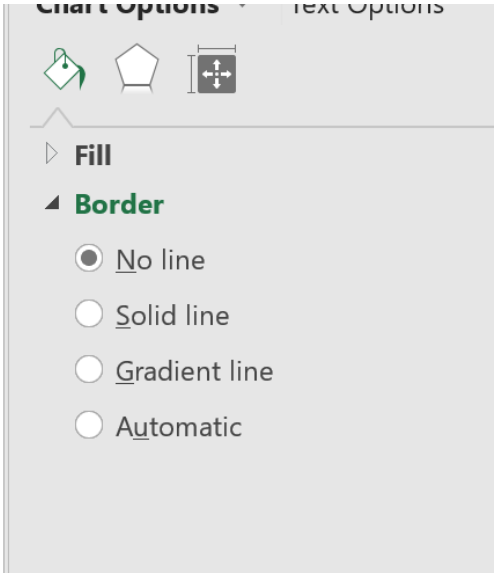


d) Right-click on the data bars themselves and select “Add Data Labels” to add the percentages to your bar chart

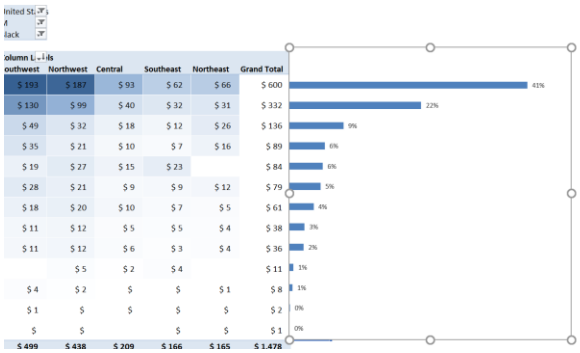


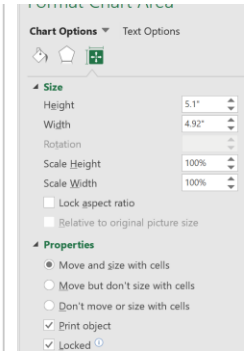
e) Delete the X and Y axis labels by clicking on one of the values and pressing “Delete”

f) Remove the border of the visualization by clicking on the chart and formatting the border to say “No Border”

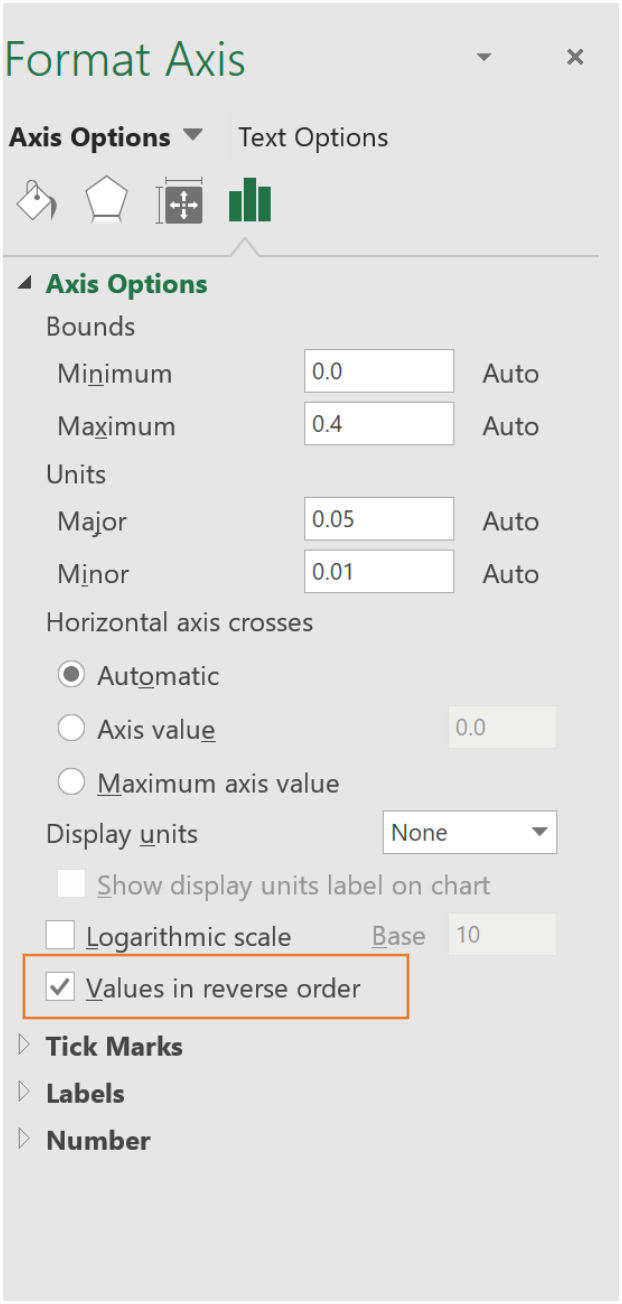


g) Enlarge and move the bar chart to cover the calculations and fit right on top of the pivot table





5. Repeat the exercise for a column chart, with the addition of **inverting your column chart axis**
NOTE: Before you delete your axis, like you did for the bar chart, make sure on the Y axis you select the following:


Format Axis
Axis Options
Text Options
Axis Options
Bounds
Minimum
0.0
Auto
Maximum
0.4
Auto
Units
Major
0.05
Auto
Minor
0.01
Auto
Horizontal axis crosses
Automatic
Axis value
0.0
Maximum axis value
Display units
None
Show display units label on chart
Logarithmic scale
Base
10
Values in reverse order
Tick Marks
Labels
Number

6. Now your butterfly chart should be complete

Congratulations on finishing your final lab - post your new butterfly chart, share it with friends! You're almost complete with the course, just the final exam remains...

SalesTerritoryCountry	United St…s
ProductLine	M
Color	Black

Sum of SalesTotal	Column L…					
Row Labels	Southwest	Northwest	Central	Southeast	Northeast	Grand Total
HL Mountain Frame - Black, 42	$ 193	$ 187	$ 93	$ 62	$ 66	$ 600
HL Mountain Frame - Black, 38	$ 130	$ 99	$ 40	$ 32	$ 31	$ 332
ML Mountain Frame - Black, 48	$ 49	$ 32	$ 18	$ 12	$ 26	$ 136
ML Mountain Frame - Black, 44	$ 35	$ 21	$ 10	$ 7	$ 16	$ 89
HL Mountain Frame - Black, 48	$ 19	$ 27	$ 15	$ 23		$ 84
ML Mountain Frame - Black, 38	$ 28	$ 21	$ 9	$ 9	$ 12	$ 79
LL Mountain Frame - Black, 44	$ 18	$ 20	$ 10	$ 7	$ 5	$ 61
LL Mountain Frame - Black, 42	$ 11	$ 12	$ 5	$ 5	$ 4	$ 38
LL Mountain Frame - Black, 48	$ 11	$ 12	$ 6	$ 3	$ 4	$ 36
HL Mountain Frame - Black, 44		$ 5	$ 2	$ 4		$ 11
ML Mountain Frame - Black, 40	$ 4	$ 2	$	$	$ 1	$ 8
LL Mountain Frame - Black, 52	$ 1	$	$	$	$	$ 2
LL Mountain Frame - Black, 40	$	$		$	$	$ 1
Grand Total	**$ 499**	**$ 438**	**$ 209**	**$ 166**	**$ 165**	**$ 1,478**