Maximizing Pivot Table

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ANALYZING DATA WITH PIVOTTABLES, SLICERS, AND PIVOTCHARTS

Lesson Objectives

In this lesson you will learn how to:

- Create a PivotTable
- Filter data using slicers
- Analyze data using PivotCharts

1.0 Create a PivotTable

One of the most powerful tools that you have your disposal when analyzing data in Excel is the PivotTable. While extremely useful, these interactive objects are somewhat cumbersome to execute properly and are often misused. For this reason, it is important to understand how they work and gain some fundamental understanding of their purpose before creating PivotTables of your own data.

Topic Objectives

In this topic, you will learn:

- About PivotTables
- How to start with questions and end with structure
- About the Create PivotTable dialog box
- About the PivotTable fields pane
- How to summarize data in a PivotTable
- About the "Show value as" functionality
- About using external data with PivotTables

PIVOTTABLES

Why are PivotTables called PivotTables? Because they let you move data around easily (by dragging and dropping fields) to perform a sort of rotation on the structure of your table and at the same time, change your view of the data. With PivotTables, columns can become rows and rows can become columns, all without altering the original data.

When a PivotTable is created, you are given the option to put it on the worksheet that you currently have open or on a new one. In either case, once the PivotTable is created you can pivot, re-pivot, sort, and summarize your data without affecting it directly. You are able to choose the level of detail that you want to view depending on your needs. Additionally, you have access to all of the summary functions in Excel to complete your data analysis.

Below you can see an example of a very simple PivotTable:

Row Labels	Sum of Quantity	Sum of Order Price
23	475	$ 2,370.25
47	89	$ 800.11
147	214	$ 27,817.86
235	55	$ 31,349.45
354	25	$ 18,750.00
589	54	$ 351.00
1358	45	$ 224.55
1459	89	$ 1,512.11
1478	2441	$ 1,503.53
1547	2	$ 269.16
1567	35	$ 5,165.65
1574	5	$ 14.95
2358	5	$ 1,999.95
3258	89	$ 177.11
4785	65	$ 2,274.35
4786	8	$ 1,599.92
5167	45	$ 1,912.50
Grand Total	**3741**	**$ 98,092.45**

In this case, the Location, Quantity, and Order Price columns have been pivoted to appear as rows. A summary of each numerical column in this PivotTable is displayed by default.

START WITH QUESTIONS, END WITH STRUCTURE

Before you even create a PivotTable, you need to think of the questions that you are trying to answer using it. Just like when working with functions or formulas, half of the work in data analysis is finding the right questions. This process is especially important for PivotTables because how you construct them depends on the question that you are asking. Once you have the question that you would like the PivotTable to answer, you can start constructing it. While there are no hard and fast rules to constructing a PivotTable, there are some ways to make things easier.

Here are a few tips to keep in mind when constructing your PivotTable.

- First, it is usually best to create rows and columns using fields that have a relatively low set number of entries. Using entries that span a huge swath of data (such as five years of transaction numbers) to create rows and columns can only cause confusion rather than answer any specific questions.
- Next, it is almost always a good idea to create a row out of a field that you need an answer from and then create a column out of that criterion to narrow down the answer.

Examine the worksheet below. You will see a range that contains 18 entries:

	A	B	C	D	E
1	Warehouse	SKU	Unit Price	Quantity	Order Price
2	Warehouse A	1574	$ 2.99	5	$ 14.95
3	Warehouse A	2358	$ 399.99	5	$ 1,999.95
4	Warehouse C	1478	$ 0.49	1587	$ 777.63
5	Warehouse A	589	$ 6.50	54	$ 351.00
6	Warehouse C	147	$ 129.99	214	$ 27,817.86
7	Warehouse A	1358	$ 4.99	45	$ 224.55
8	Warehouse A	4785	$ 34.99	65	$ 2,274.35
9	Warehouse A	5167	$ 42.50	45	$ 1,912.50
10	Warehouse C	3258	$ 1.99	89	$ 177.11
11	Warehouse A	4786	$ 199.99	8	$ 1,599.92
12	Warehouse A	235	$ 569.99	55	$ 31,349.45
13	Warehouse A	1567	$ 147.59	35	$ 5,165.65
14	Warehouse B	1459	$ 16.99	89	$ 1,512.11
15	Warehouse A	1478	$ 0.85	854	$ 725.90
16	Warehouse A	23	$ 4.99	475	$ 2,370.25
17	Warehouse A	47	$ 8.99	89	$ 800.11
18	Warehouse B	354	$ 750.00	25	$ 18,750.00
19	Warehouse A	1547	$ 134.58	2	$ 269.16

A PivotTable created from this dataset answers the question, “What is the total value of the products stored in each warehouse?”

Row Labels	Sum of Order Price	
Warehouse A	$	49,057.74
Warehouse B	$	20,262.11
Warehouse C	$	28,772.60
Grand Total	**$**	**98,092.45**

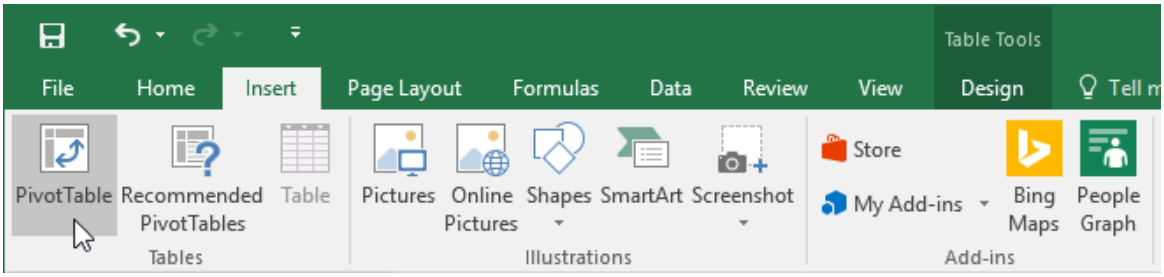
As you can see, the warehouses are listed by row and the price (the criterion) is listed as a column. A SUM function automatically totals the order price of each product price stored by each warehouse.

You can change the function that is used by the PivotTable to whatever you need in order to answer a question. For example, suppose you wanted to see how many different products each warehouse had, not a total count. You could do this by adding the SKU field as a column and applying the COUNT function:

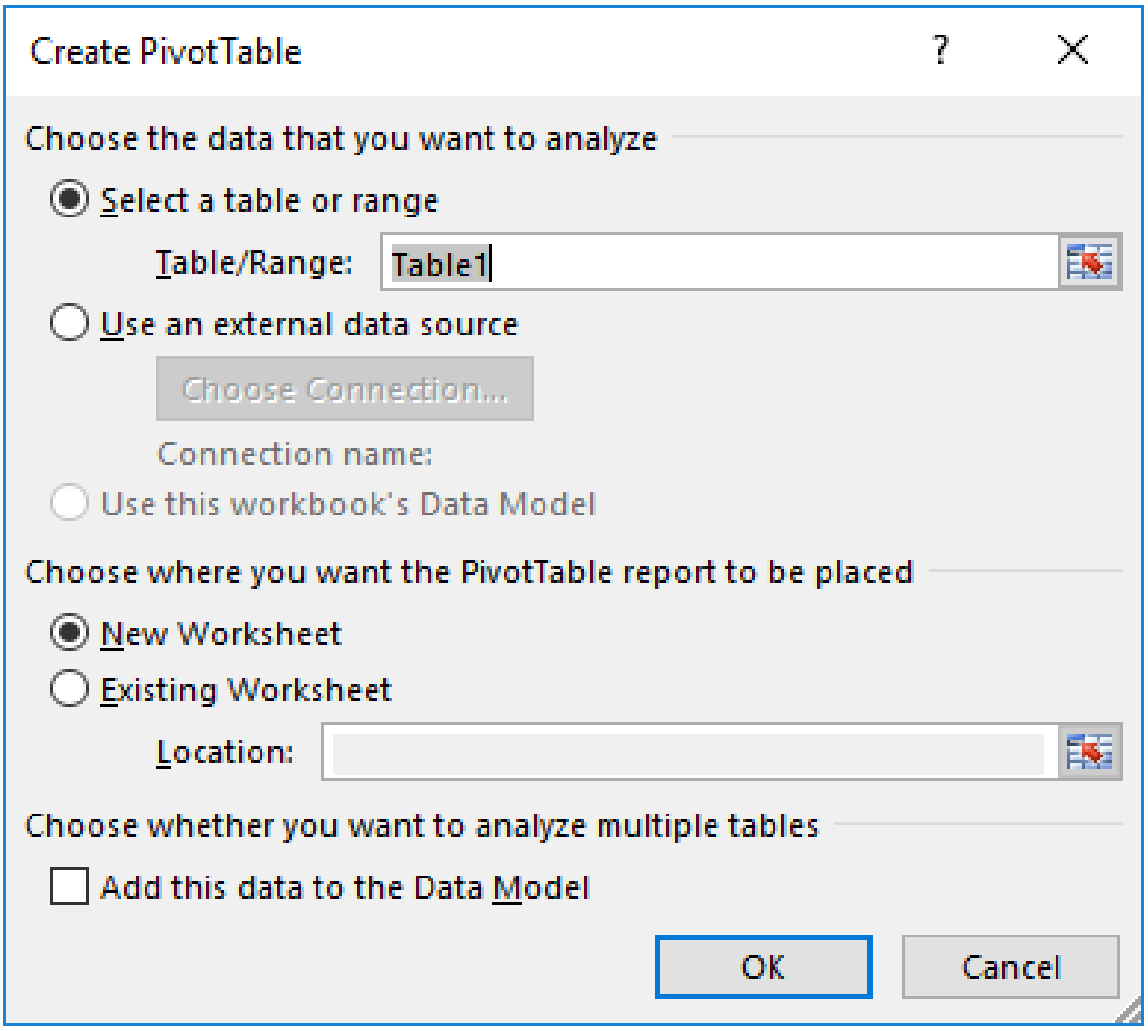
Row Labels	Count of SKU
Warehouse A	13
Warehouse B	2
Warehouse C	3
Grand Total	**18**

THE CREATE PIVOTTABLE DIALOG BOX

The first step to creating a PivotTable is to open the Create PivotTable dialog box by clicking Insert → PivotTable:



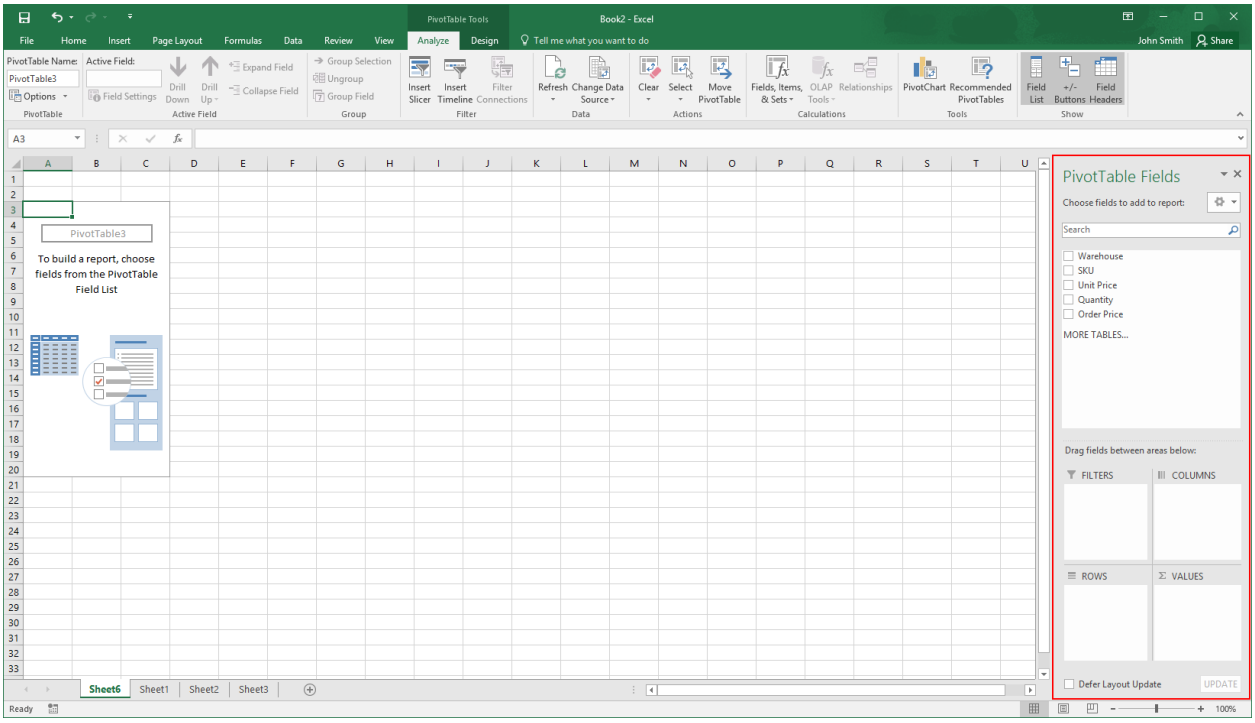
The controls in the Create PivotTable dialog box are used to choose the dataset (or data source) for the new PivotTable that you are creating, and where you want it to be placed. By default new PivotTables will be placed on new worksheets, but you do have the option of adding them to existing worksheets in your workbook:



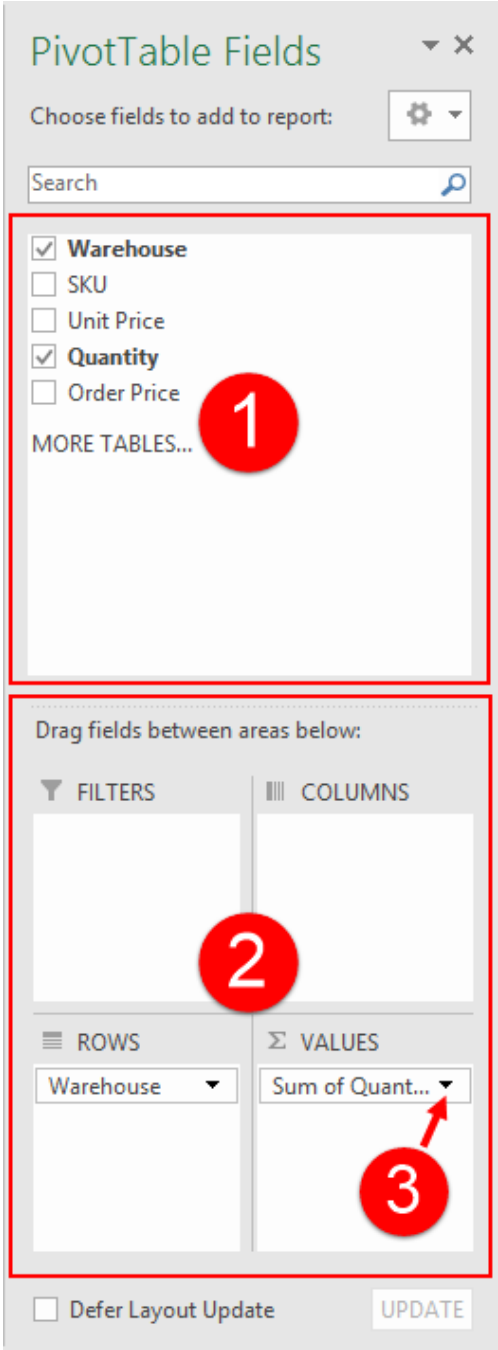
Once you have set your options, click OK to create the PivotTable.

THE PIVOTTABLE FIELDS PANE

When you insert a PivotTable into your workbook, the PivotTable Field task pane will automatically be displayed on the right hand-side of the Excel 2016 window:



The PivotTable Field List pane is the primary tool that you will use to configure PivotTables. (Note that it is hidden when the PivotTable is not selected.) The **top portion of this pane (1)** lists all of the fields from the dataset that you can add to the PivotTable. To add or remove a field from the PivotTable, toggle the corresponding checkbox. Alternatively, to give you more control over field placement on the PivotTable, you can click and drag these fields to the PivotTable itself. Note that field names are derived from the column header in the dataset:



The bottom half of this pane is comprised of **four areas (2)**: Filters, Columns, Rows, and Values. If you drag fields between these areas, you are able to change the structure of the PivotTable and choose the values that will be used to make calculations.

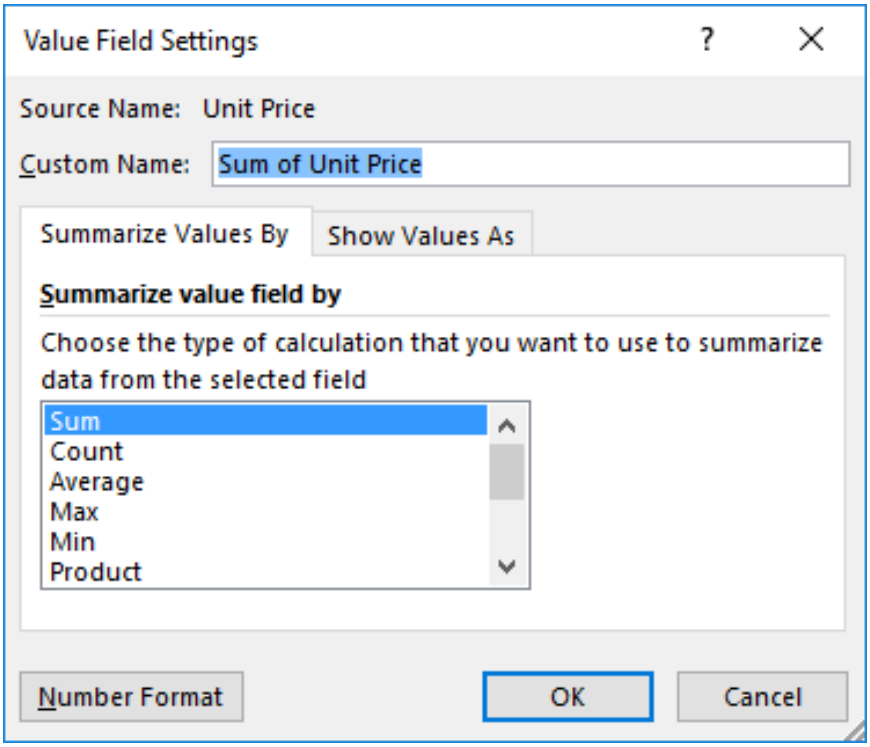
Here is an overview of these four areas.

- Adding fields to the **Filters area** will include those field values as filter criteria.
- The **Columns area** will create columns out of unique field entries.
- Similarly, the **Rows area** will create rows out of unique field entries.
- Finally, fields that are dragged to the **Values area** will have calculations performed on them or their values summarized.
- Note that any fields that appear in these four areas will include a **pull-down arrow (3)** that give you access to a number of different settings and the Field Settings dialog that you can use to further customize your PivotTable.

Remember that any changes that you make in the PivotTable Field List pane will be applied dynamically. Additionally, due to the flexible nature of PivotTables, you can add or remove fields to or from the pane at any time.

SUMMARIZE DATA IN A PIVOTTABLE

By combining options from the Summarize Values By and the Show Values As tabs on the Value Field Settings dialog box, you can get further insight into your data. For example, suppose that you want to calculate the total unit price of all the products that each warehouse is storing. You can do this by dragging the Unit Price field to the Values area of the PivotTable Field List pane. Next, you would then click the drop-down arrow for this field and click the Field Settings option to open the Value Field Settings dialog box. Inside the Value Field Settings dialog box, you would then ensure that the Sum function was selected:

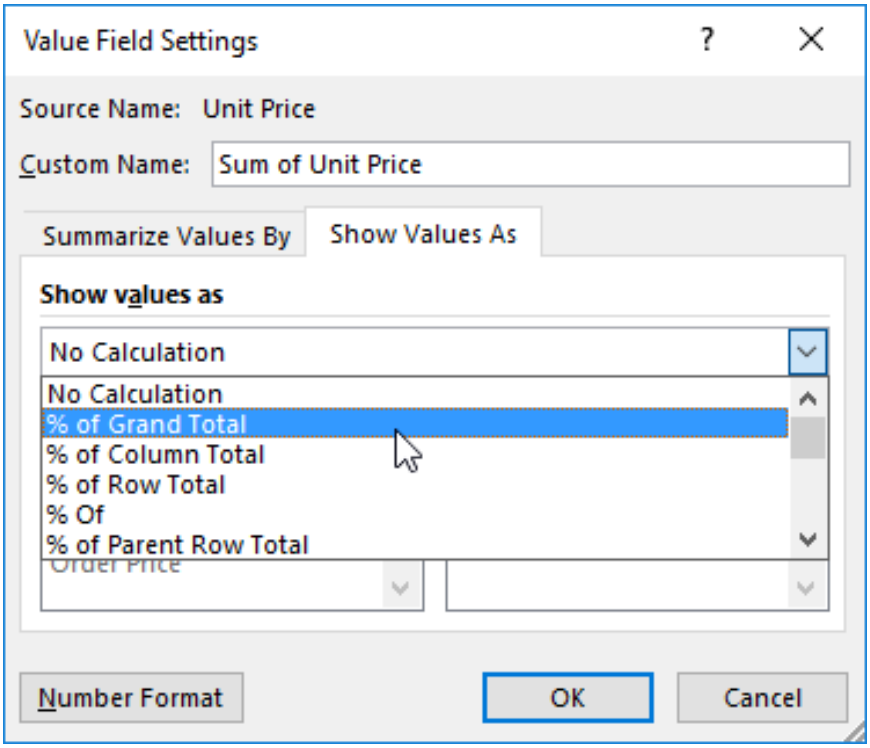


The PivotTable will then display the sum of the unit prices found in each warehouse:

Row Labels	Sum of Unit Price
Warehouse A	1558.94
Warehouse B	766.99
Warehouse C	132.47
Grand Total	**2458.4**

THE "SHOW VALUES AS" FUNCTIONALITY OF A PIVOTTABLE

Now suppose that you want to see the percentage of the total that each warehouse holds in value. While you could do this calculation manually, it would be easier to change how the values are shown. Within the Show Values as tab of the Value Field Settings dialog box, you would click the "% of Grand Total" option from the "Show values as" drop-down menu:

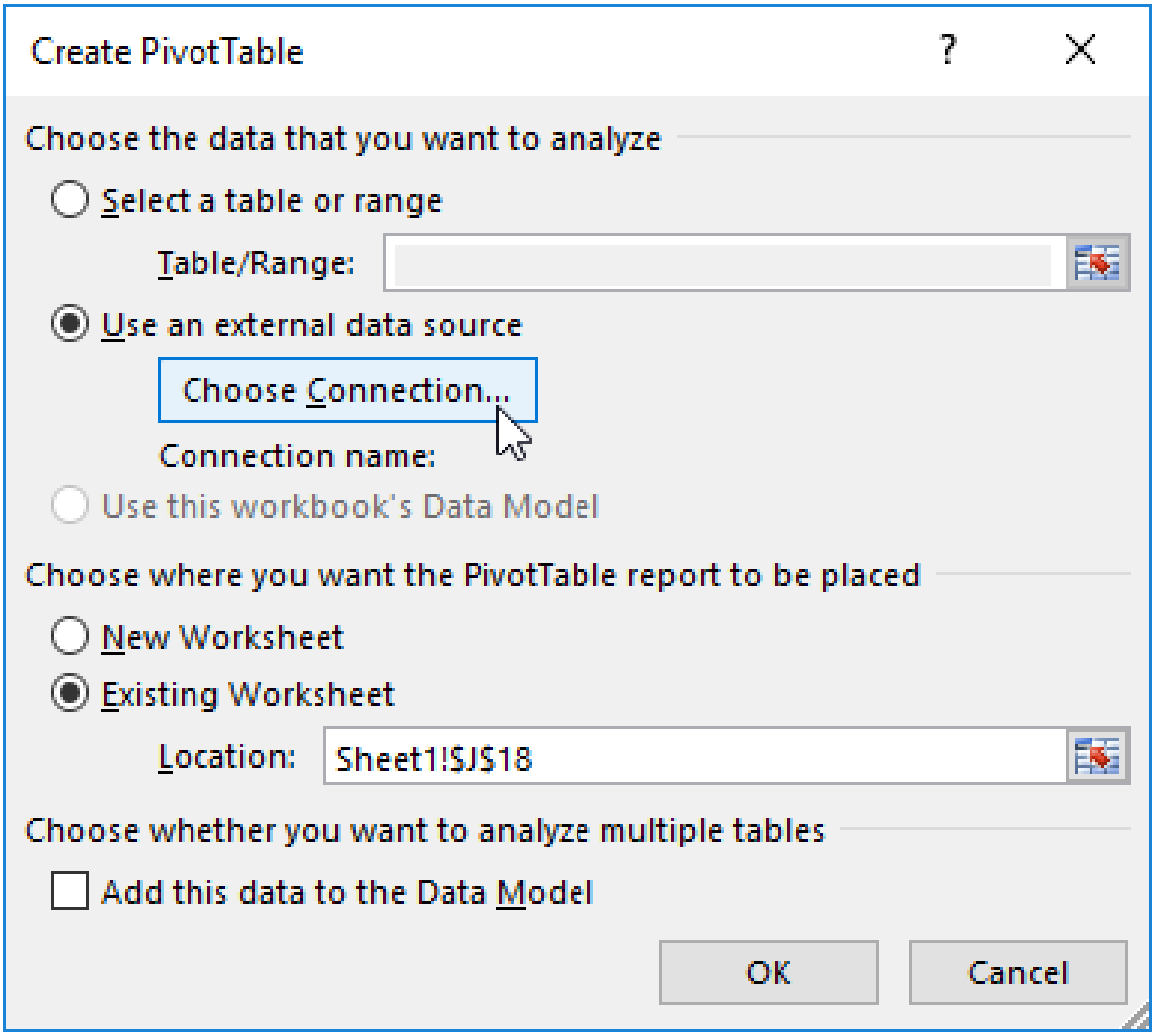


You will now see what percentage of the grand total each warehouse holds. In this case you can see that Warehouse A contains the vast majority of value in products, while Warehouse C has the least:

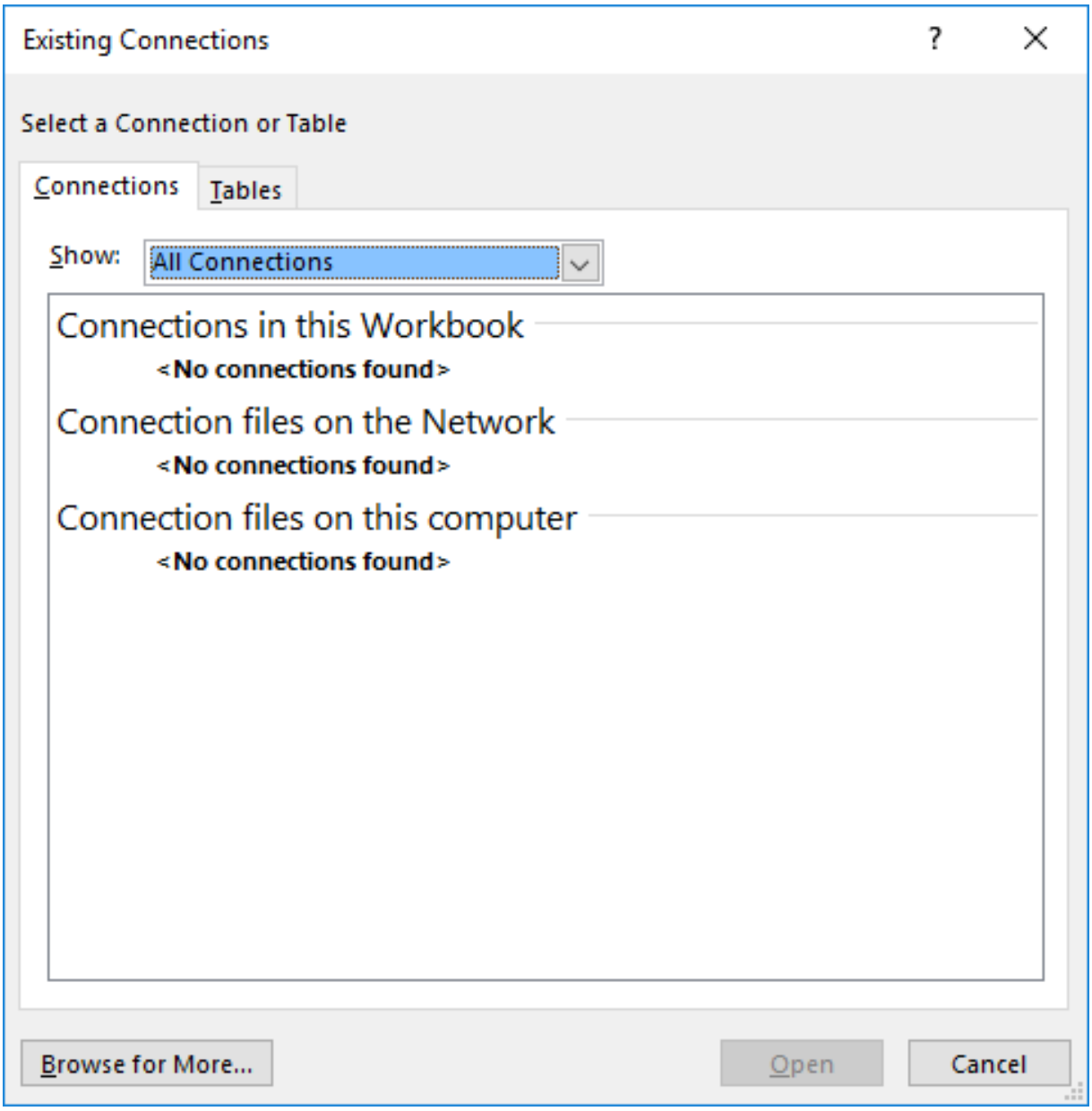
Row Labels	Sum of Unit Price
Warehouse A	63.41%
Warehouse B	31.20%
Warehouse C	5.39%
Grand Total	**100.00%**

EXTERNAL DATA

If the data that you would like to analyze exists outside of Excel, such as a Microsoft Access database, you can still use PivotTables to summarize it. To do this, you need to create a connection to that external data by opening the Create PivotTable dialog box and then clicking the "Use an external data source" radio button. Next, click the Choose Connection button:



The Existing Connections dialog box will then allow you to choose from existing connections that exist, as well as browse for more connections:

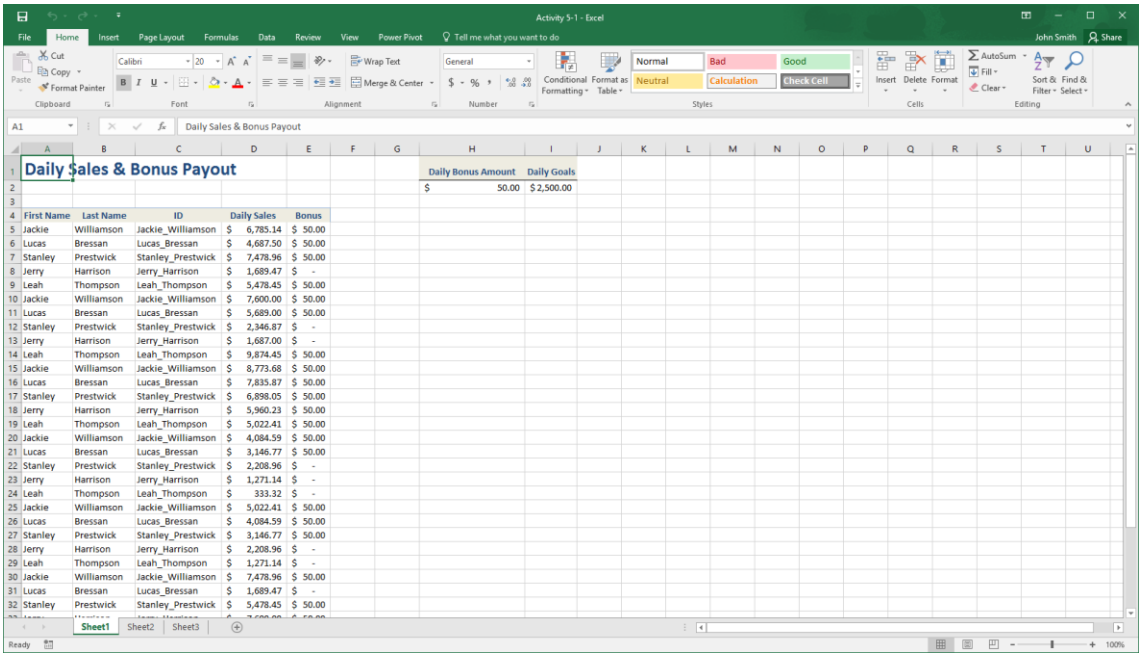


ACTIVITY -1

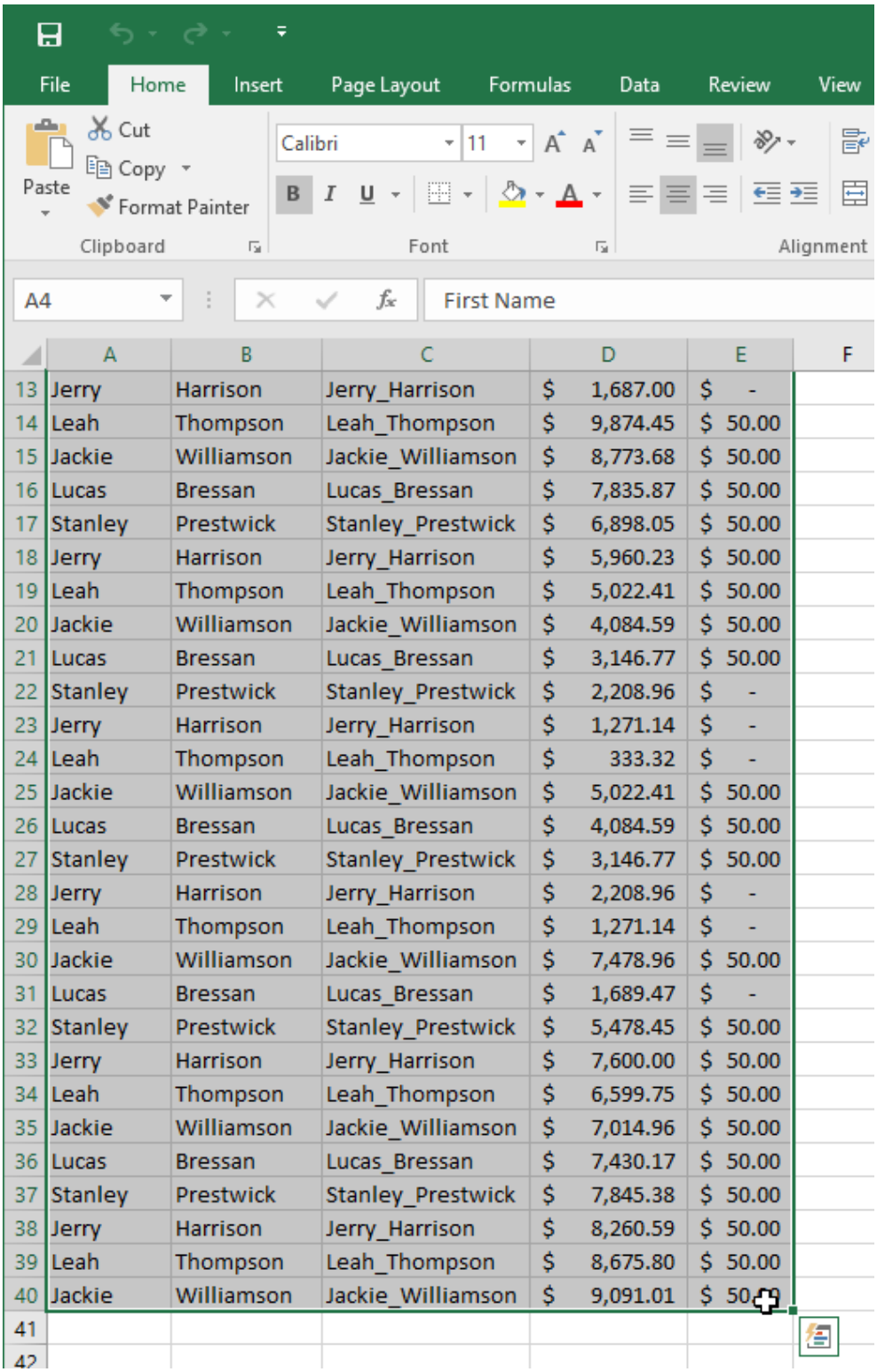
Creating PivotTables

You have been given the raw transactional data for the daily sales numbers of your sales staff. In order to determine the total sales numbers for each sales associate, you would like to create a PivotTable using this data.

1. To begin, open Activity -1 from your Exercise Files folder:

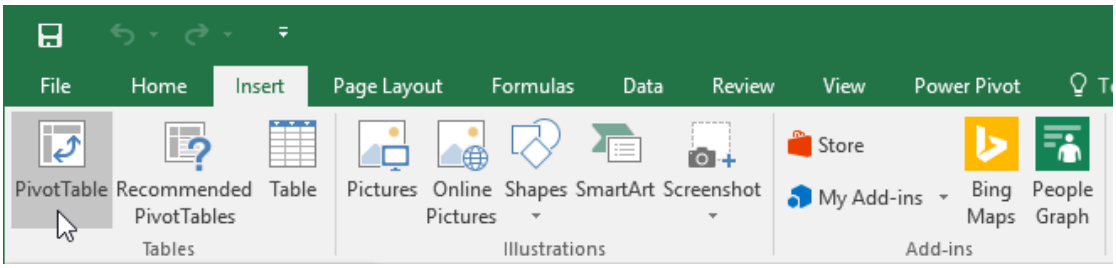


2. Use your cursor to select cells A4:E40:

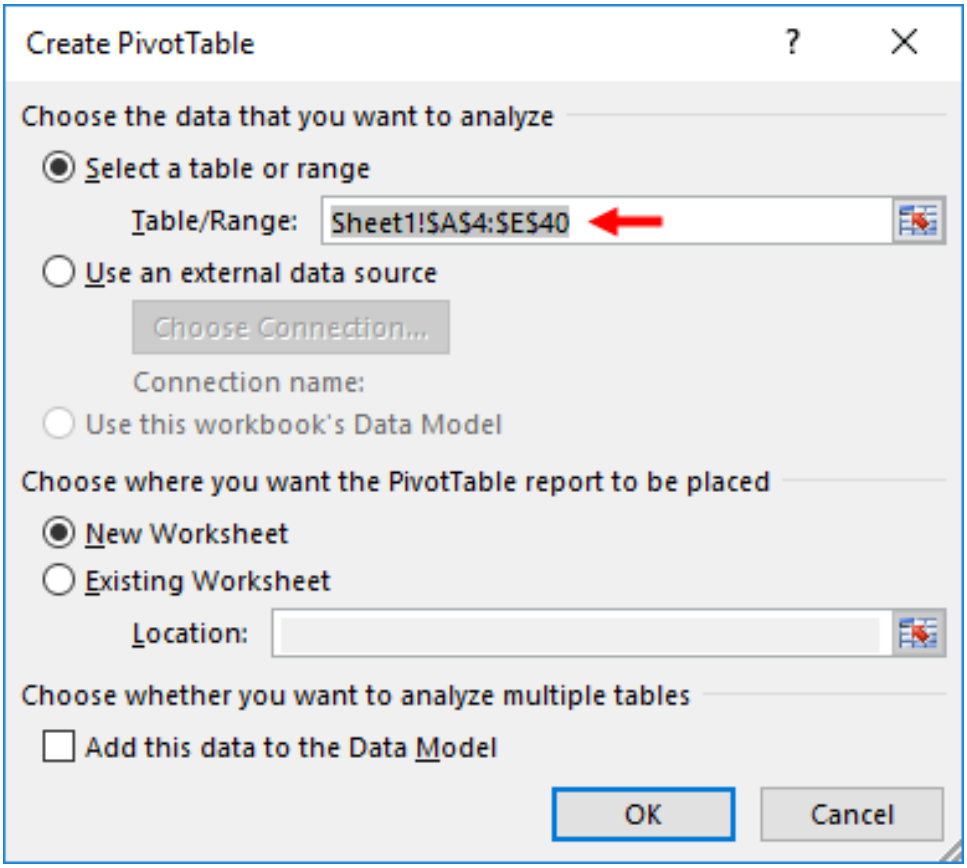


	A	B	C	D	E	F
13	Jerry	Harrison	Jerry_Harrison	$ 1,687.00	$ -	
14	Leah	Thompson	Leah_Thompson	$ 9,874.45	$ 50.00	
15	Jackie	Williamson	Jackie_Williamson	$ 8,773.68	$ 50.00	
16	Lucas	Bressan	Lucas_Bressan	$ 7,835.87	$ 50.00	
17	Stanley	Prestwick	Stanley_Prestwick	$ 6,898.05	$ 50.00	
18	Jerry	Harrison	Jerry_Harrison	$ 5,960.23	$ 50.00	
19	Leah	Thompson	Leah_Thompson	$ 5,022.41	$ 50.00	
20	Jackie	Williamson	Jackie_Williamson	$ 4,084.59	$ 50.00	
21	Lucas	Bressan	Lucas_Bressan	$ 3,146.77	$ 50.00	
22	Stanley	Prestwick	Stanley_Prestwick	$ 2,208.96	$ -	
23	Jerry	Harrison	Jerry_Harrison	$ 1,271.14	$ -	
24	Leah	Thompson	Leah_Thompson	$ 333.32	$ -	
25	Jackie	Williamson	Jackie_Williamson	$ 5,022.41	$ 50.00	
26	Lucas	Bressan	Lucas_Bressan	$ 4,084.59	$ 50.00	
27	Stanley	Prestwick	Stanley_Prestwick	$ 3,146.77	$ 50.00	
28	Jerry	Harrison	Jerry_Harrison	$ 2,208.96	$ -	
29	Leah	Thompson	Leah_Thompson	$ 1,271.14	$ -	
30	Jackie	Williamson	Jackie_Williamson	$ 7,478.96	$ 50.00	
31	Lucas	Bressan	Lucas_Bressan	$ 1,689.47	$ -	
32	Stanley	Prestwick	Stanley_Prestwick	$ 5,478.45	$ 50.00	
33	Jerry	Harrison	Jerry_Harrison	$ 7,600.00	$ 50.00	
34	Leah	Thompson	Leah_Thompson	$ 6,599.75	$ 50.00	
35	Jackie	Williamson	Jackie_Williamson	$ 7,014.96	$ 50.00	
36	Lucas	Bressan	Lucas_Bressan	$ 7,430.17	$ 50.00	
37	Stanley	Prestwick	Stanley_Prestwick	$ 7,845.38	$ 50.00	
38	Jerry	Harrison	Jerry_Harrison	$ 8,260.59	$ 50.00	
39	Leah	Thompson	Leah_Thompson	$ 8,675.80	$ 50.00	
40	Jackie	Williamson	Jackie_Williamson	$ 9,091.01	$ 50.00	
41						
42						

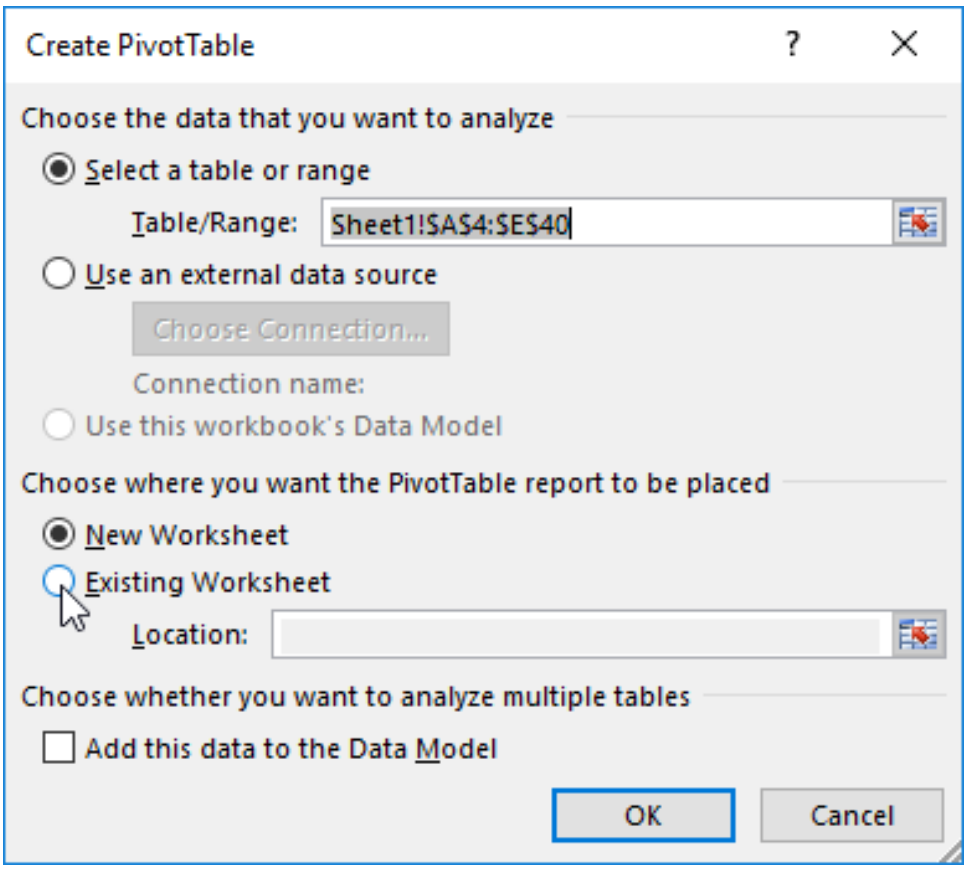
3. Next, click Insert → PivotTable:



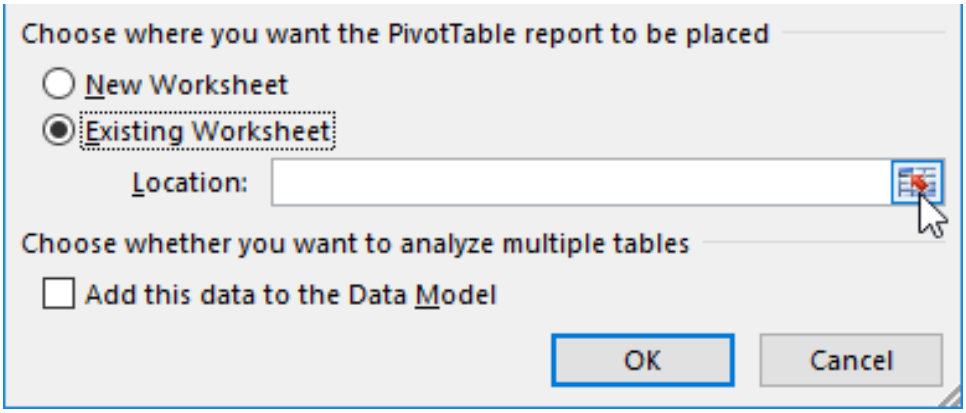
4. The Create PivotTable dialog box will now be displayed. The data range that you previously selected will be shown within the Table/Range text box:



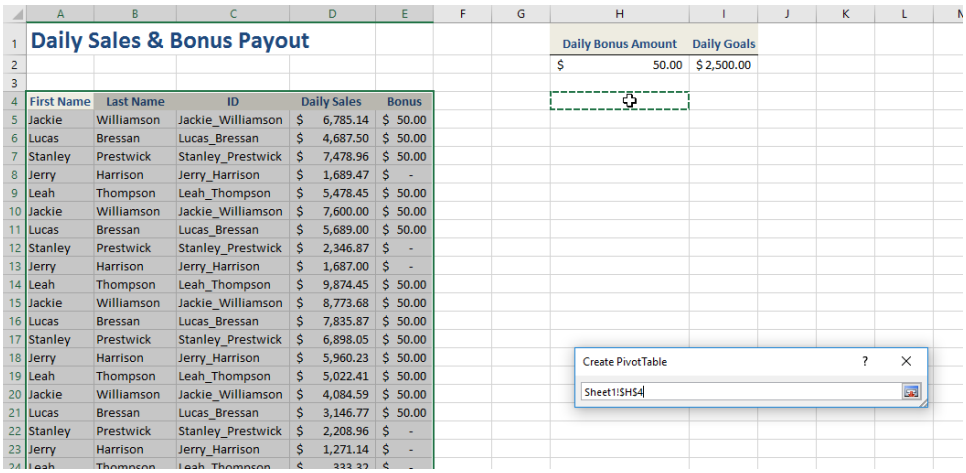
5. You want this new PivotTable to be inserted into the current worksheet, so click the Existing Worksheet radio button:



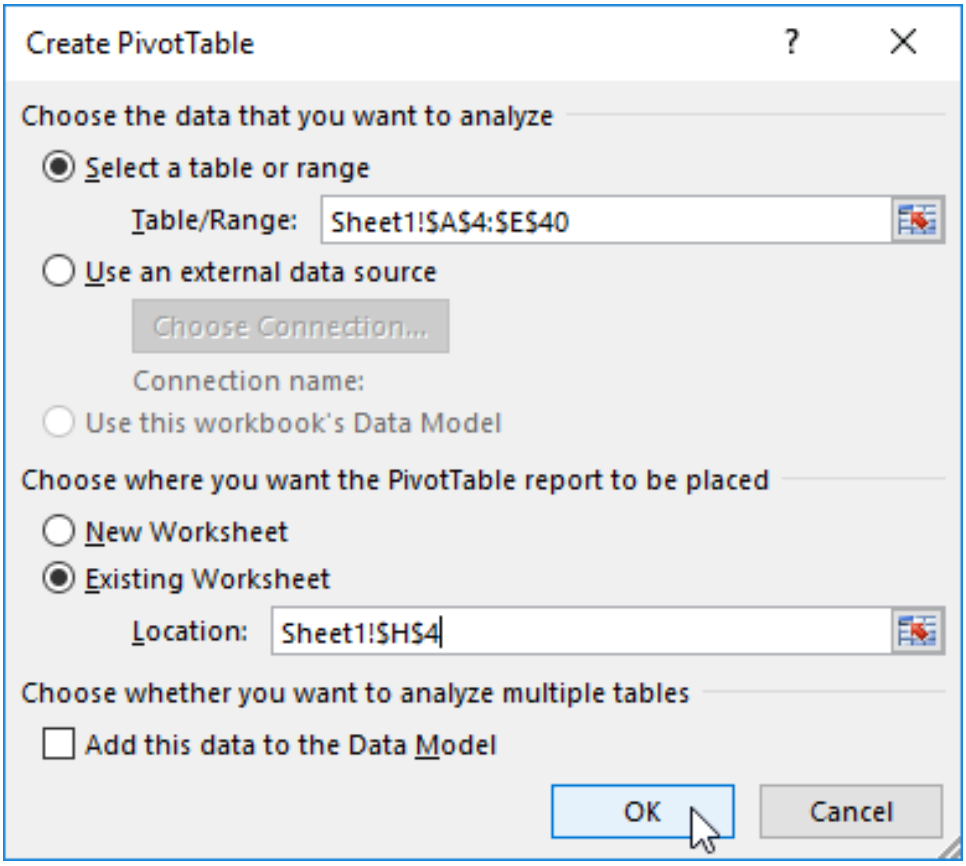
6. Inside the Location text box, click the range picker button ( ):



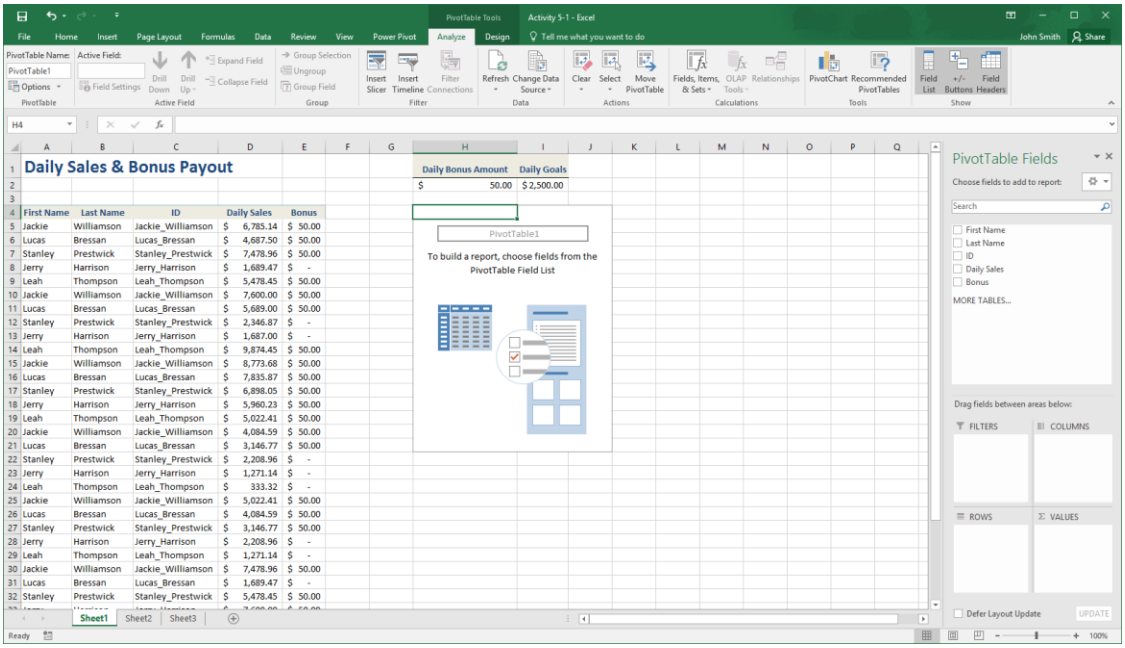
7. Use your cursor to select cell H4:



8. Press Enter to apply the new location. Back at the Create PivotTable dialog box, click OK to apply the new settings:



9. The PivotTable will now be added to the current worksheet in the location that you previously set:



10. Save your changes as Activity -1 Complete and then close Microsoft Excel 2016.

2.0 Filter Data by Using Slicers

While regular filters can be effective in drilling down through your data, they can quickly become a chore to manage. Between having to clear existing filters before applying new ones and trying to determine which data is actively being filtered out, filters definitely have some downsides. To give you more control over filtering capabilities, Excel provides slicers. These are easy-to-use filters that can be applied multiple times without negative effects on the data's readability. Throughout this topic you will learn about slicers and how to use them to filter data in a PivotTable.

Topic Objectives

In this topic, you will learn:

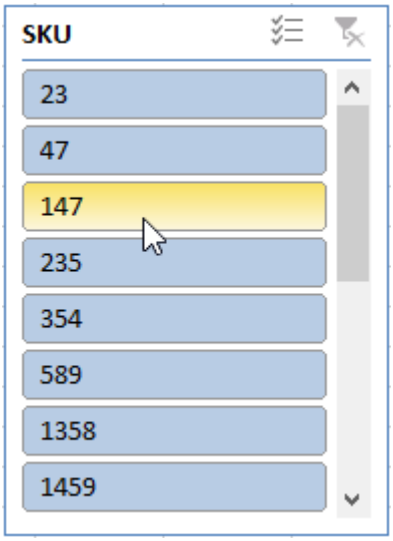
- About slicers
- About the Insert Slicer dialog box

SLICERS

Slicers can be a great help when working with PivotTable data. While the main purpose of PivotTables is to help you analyze information and find patterns or trends that might be difficult to spot in a large volume of raw data, the Slicer tool takes this idea to the next level.

Slicers can be created out of any field that exists within the dataset for the PivotTable. These slicers can then be used to filter each field by its unique entries. For example, if you wanted to filter out data from one of the three warehouses in a worksheet that tracks inventory, a slicer would be able to do that for you easily. Slicers can also be linked to more than one PivotTable. Typically, this occurs when using raw transactional data as a dataset and multiple PivotTables exist for that data.

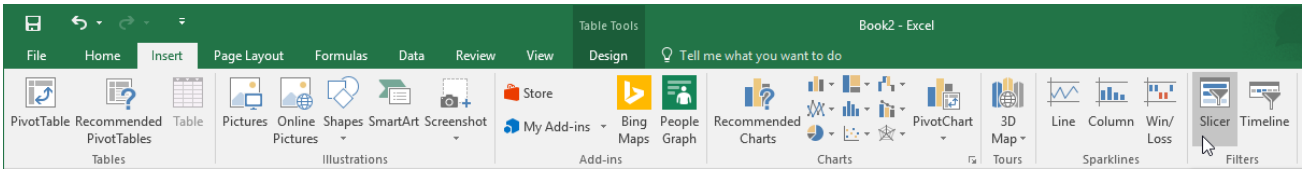
Slicers are displayed graphically as a small pane that contains a series of buttons that represent each unique value from the field that the slicer is associated with. To toggle between filtering and not filtering unique values from the field, you can simply click these buttons:



Filters in a slicer that are not applied appear blue, while those that are white are active. Should a filter button appear grayed out, this indicates that an already active filter has removed the values represented by this filter from view. Multiple filters that exist in the same slicer can be applied at once by holding down the Ctrl key and clicking on each filter that you would like to apply. Additionally, the Clear Filter button in the top right-hand corner of a slicer will deactivate all of its filters.

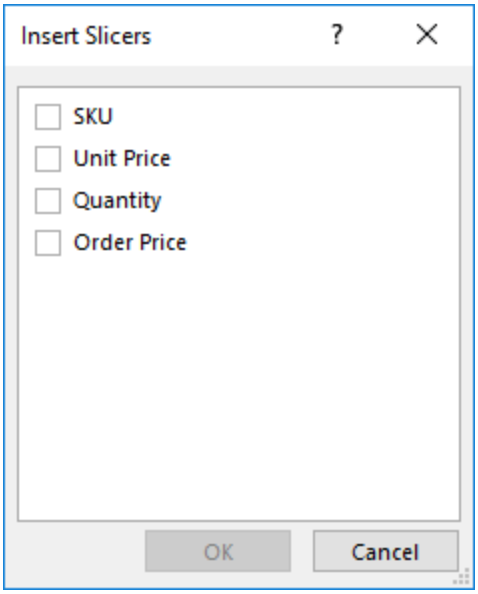
THE INSERT SLICERS DIALOG BOX

To create a slicer, first click anywhere in the PivotTable to display the PivotTable Tools tabs. Next, click Insert → Slicer:



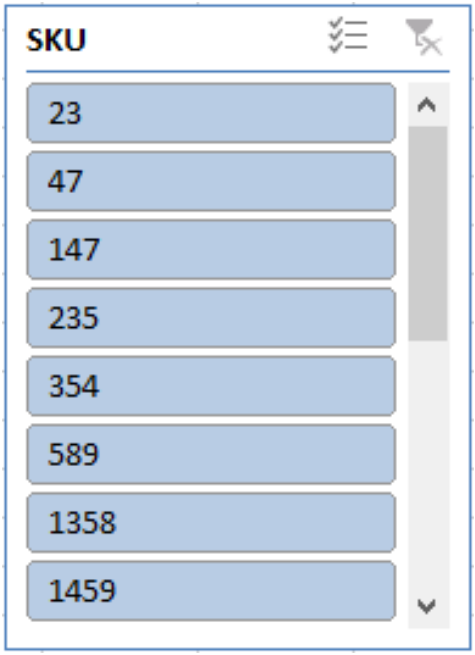
(Alternatively, you can click Table Tools – Design → Insert Slicer.)

This action will display the Insert Slicers dialog box:



This dialog box will list each field in the PivotTable as a checkbox. To create a slicer of a field, check its associated checkbox. Once you have finished choosing the fields that you would like to appear as filters, click OK to apply your settings.

Returning to the worksheet, you will now see the slicer(s) placed there:

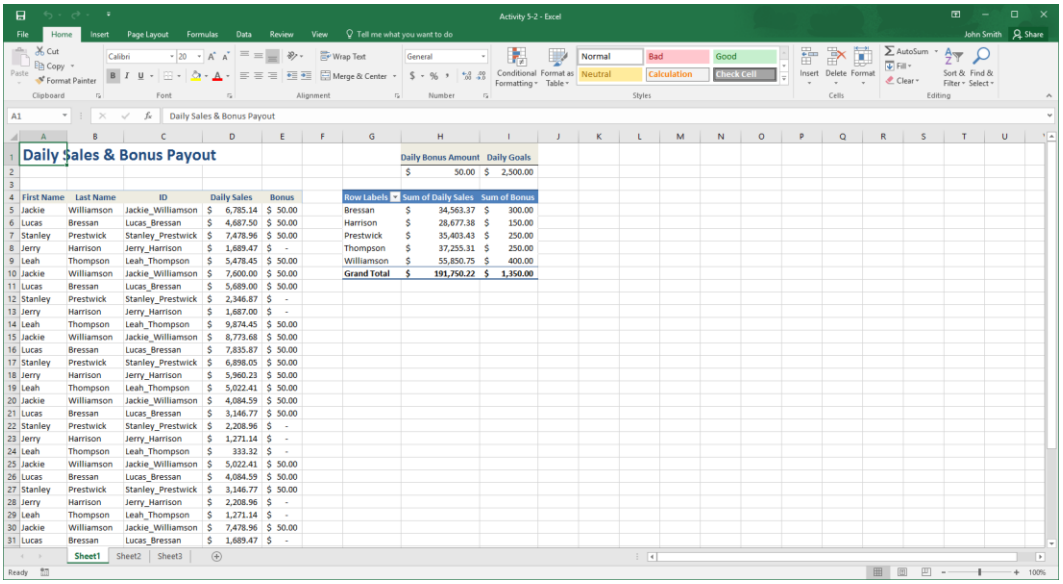


ACTIVITY -2

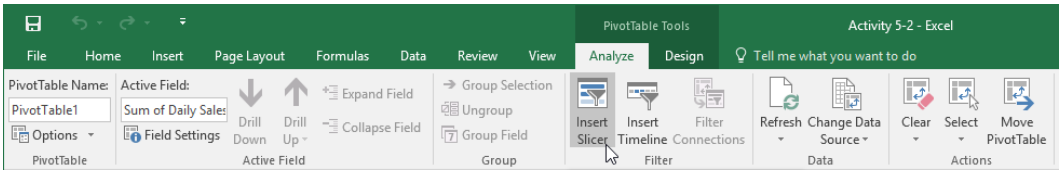
Filtering Data Using Slicers

You have constructed a PivotTable that displays the total sales made by each sales associate, as well the total amount of bonuses they each received. Jerry Harrison and Leah Thompson are going to form their own sales department that sells a specialty product. In an effort to estimate bonus payouts and sales goals you would like to use slicers to display only their data in the PivotTable.

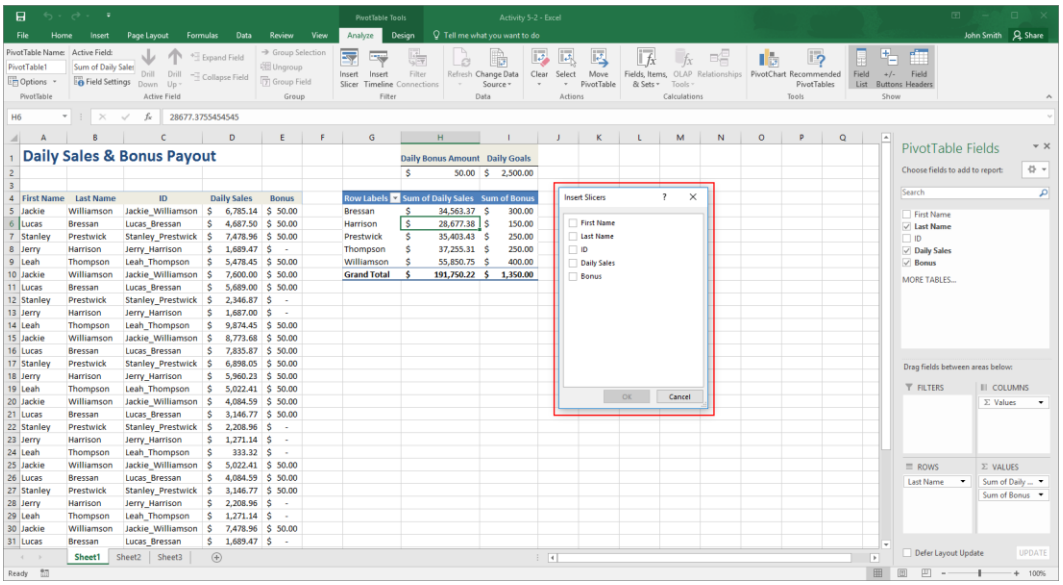
1. To begin, open Activity -2 from your Exercise Files folder:



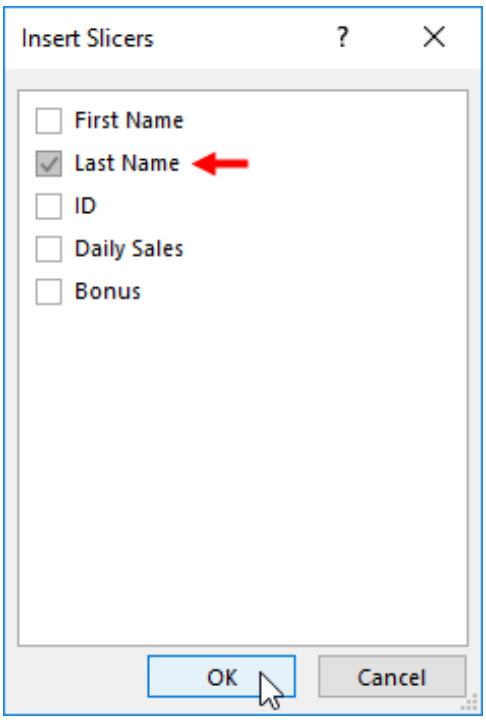
2. Click inside the PivotTable to display the PivotTable Tools contextual tabs. Next, click PivotTable Tools – Analyze → Insert Slicer:



3. The Insert Slicer dialog box will now be displayed:

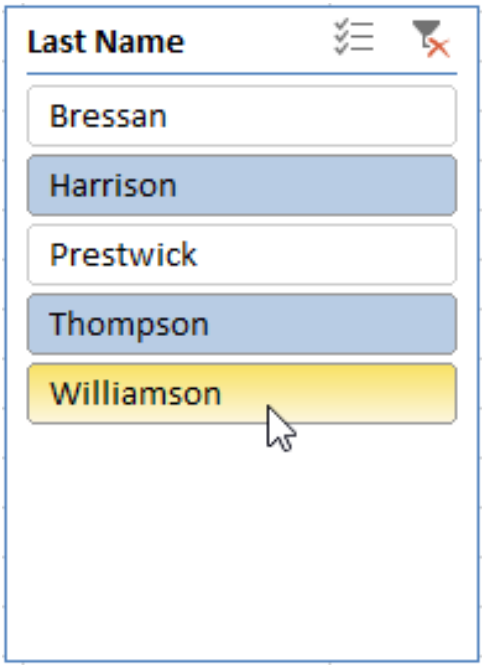


4. Check the Last Name checkbox and then click OK:

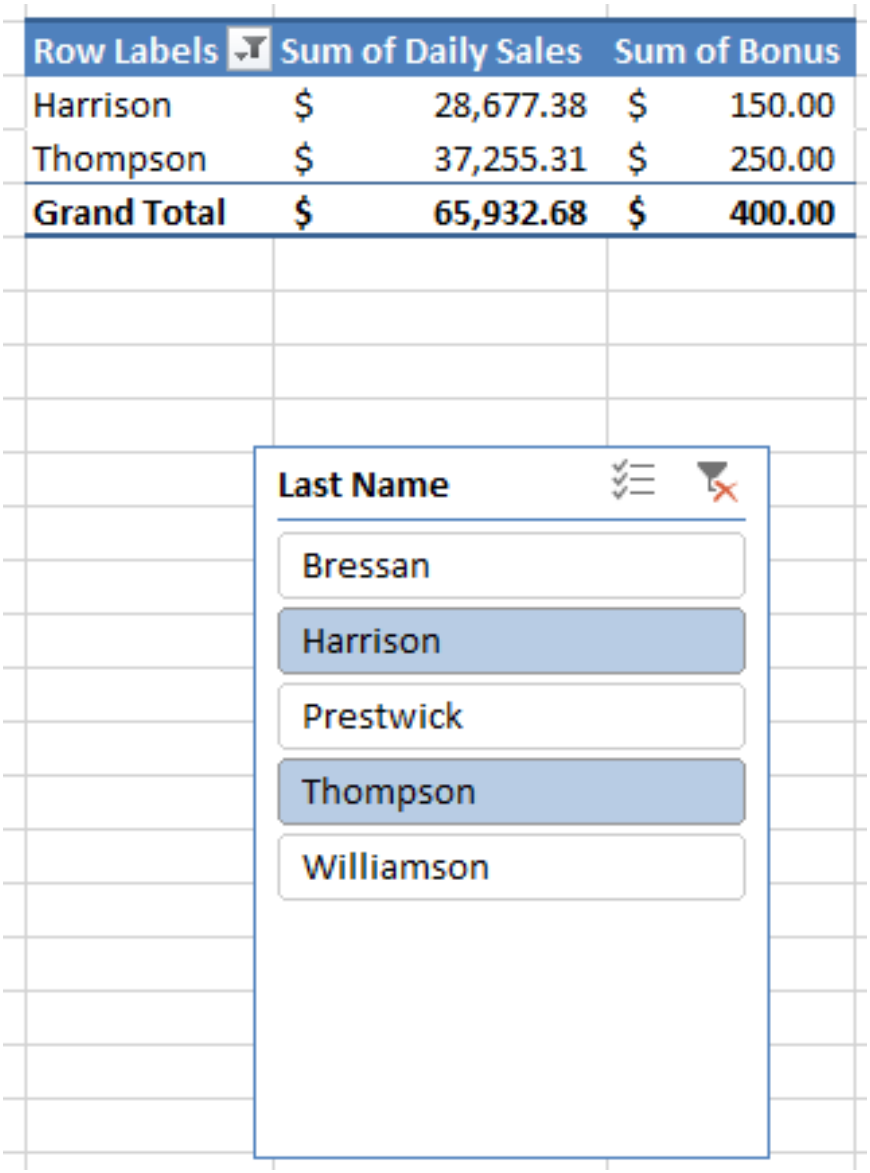


5. A slicer for the Last Name field will now be on your worksheet:

6. For this exercise you want to filter out everyone except for Jerry Harrison and Leah Thompson. While holding down the Ctrl key, click the Bressan, Prestwick, and Williamson buttons:



7. The entries that you clicked on in the slicer will now have been filtered out of the PivotTable:



Row Labels	Sum of Daily Sales	Sum of Bonus
Harrison	$ 28,677.38	$ 150.00
Thompson	$ 37,255.31	$ 250.00
Grand Total	**$ 65,932.68**	**$ 400.00**

8. Save your work as Activity -2 Complete and then close Microsoft Excel 2016.

3.0 Analyze Data with PivotCharts

PivotTables are fantastic at analyzing your data, but they are not so great at being able to quickly convey it. To solve this problem, PivotTable data can quickly be converted into charts just as you can with regular datasets. Over the course of this topic you will learn how use PivotCharts to present PivotTable data visually.

Topic Objectives
In this topic, you will learn:

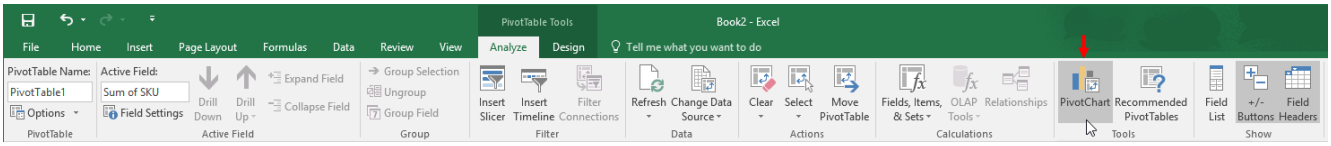
- About PivotCharts
- How to create PivotCharts
- How to apply a style to a PivotChart

PIVOTCHARTS

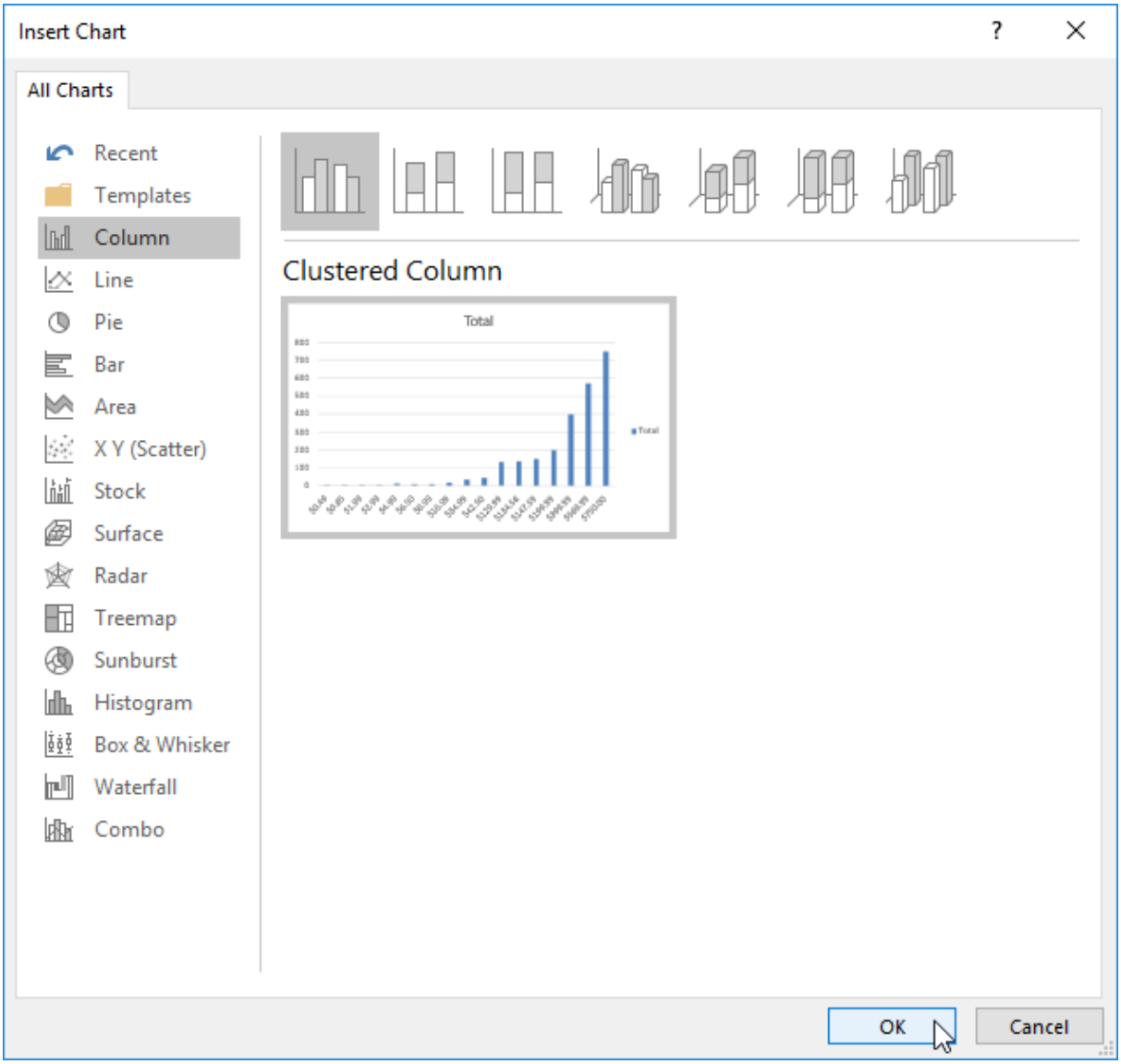
PivotCharts are just like regular charts in that they are designed to convey data analysis in a visual form. The primary difference is simply that PivotCharts are linked to PivotTables, while charts are linked to data ranges or tables. Despite this difference, both PivotCharts and regular charts share many of the same features, such as dynamic updating, lots of chart types to choose from, and easy creation.

CREATING PIVOTCHARTS

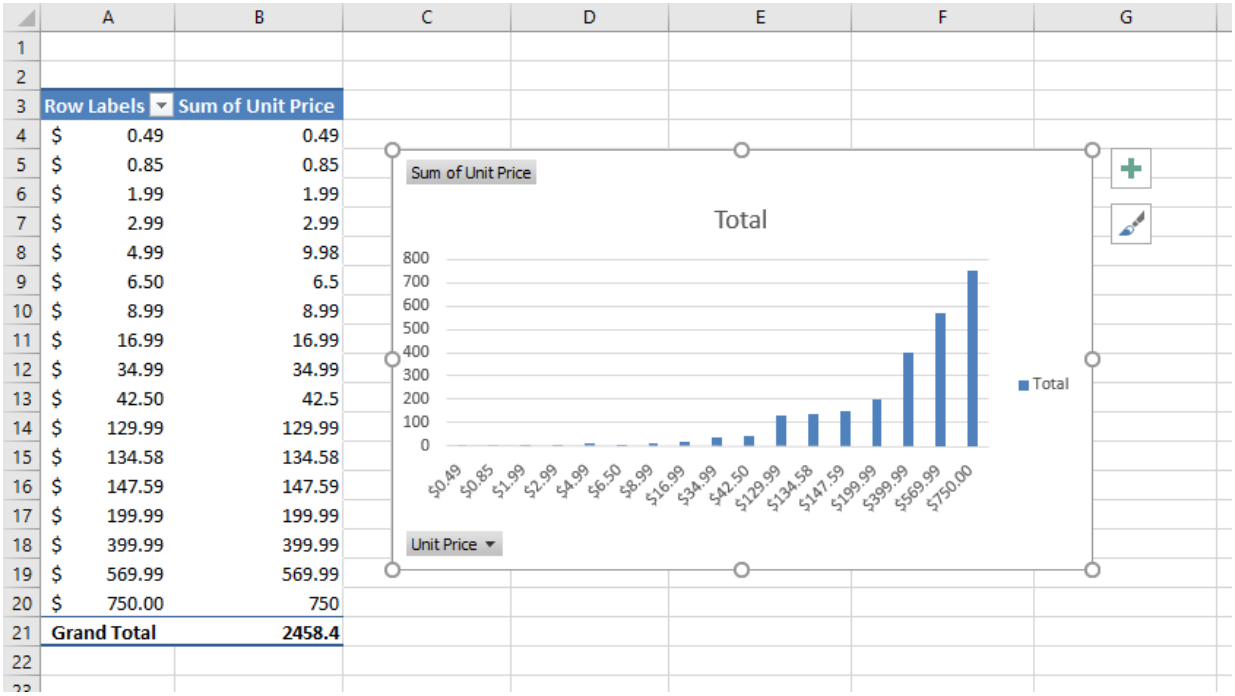
To insert a PivotChart into your worksheet, first click to select the PivotTable that you would like to work with. Next, click PivotTable Tools – Analyze → PivotChart:



This action will display the Insert Chart dialog box. Just like when working with regular charts, you need to consider what chart type best suits your data. For this example, the Clustered Column chart type has been selected:



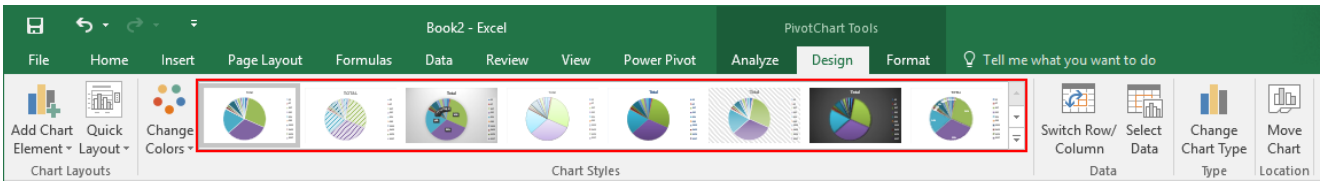
Once you click OK, the PivotChart will then be added to the current worksheet, displaying data from the selected PivotTable:



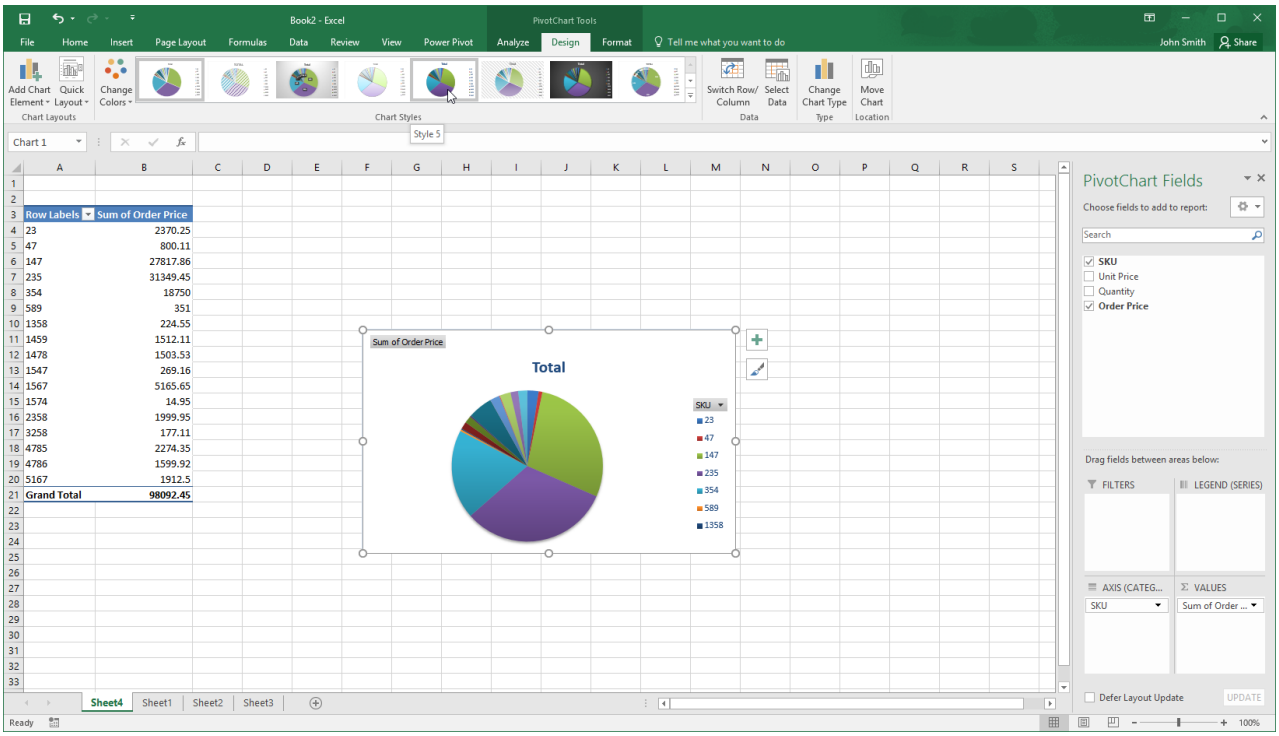
APPLYING A STYLE TO A PIVOTCHART

PivotChart styles are used to slightly adjust how a chart is laid out without changing the primary color scheme. This is excellent for adding a little visual flair to your chart and on occasion, a new chart style can also help a chart's readability.

To format a PivotChart with a style, first click to select the PivotChart in question and then click PivotChart Tools – Design. Examine the Chart Styles group and you will see a gallery of different chart styles that you can choose from:

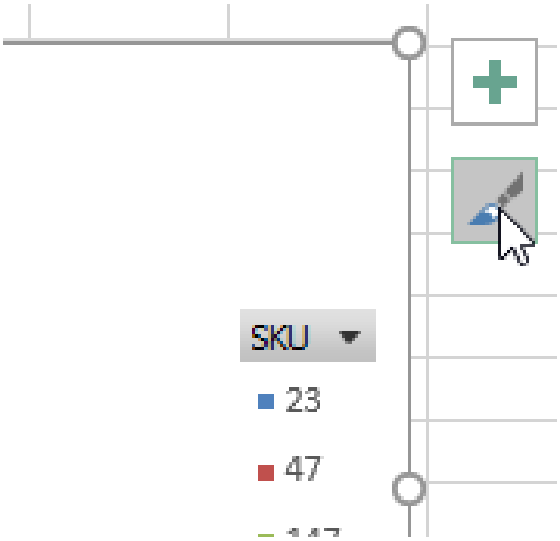


Move your cursor over these chart styles and you will see a preview of how these style will look once applied to your chart. Clicking on a style will apply it:



Row Labels	Sum of Order Price
23	2370.25
47	800.11
147	27817.86
235	31349.45
354	18750
589	351
1358	224.55
1459	1512.11
1478	1503.53
1547	269.16
1567	5165.65
1574	14.95
2358	1999.95
3258	177.11
4785	2274.35
4786	1599.92
5167	1912.5
Grand Total	98092.45

You can also find these styles by clicking the Chart Styles button that appears to the top right of a selected chart:

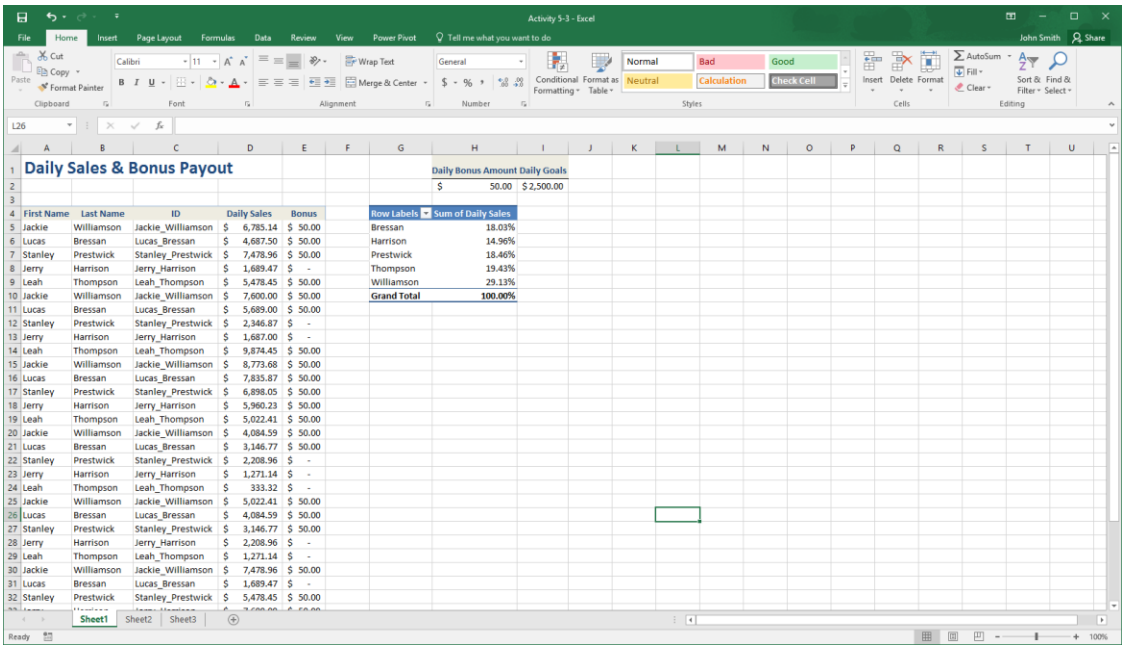


ACTIVITY -3

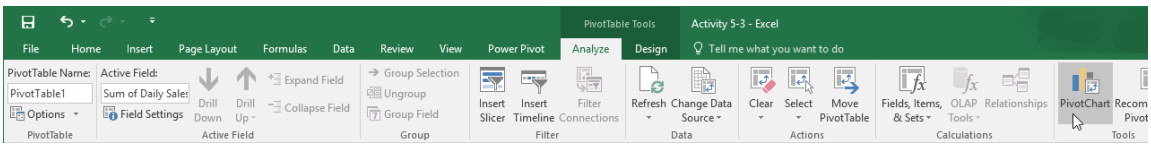
Analyzing Data with PivotCharts

Now that you have completed a PivotTable, you would like to visualize its results using a PivotChart.

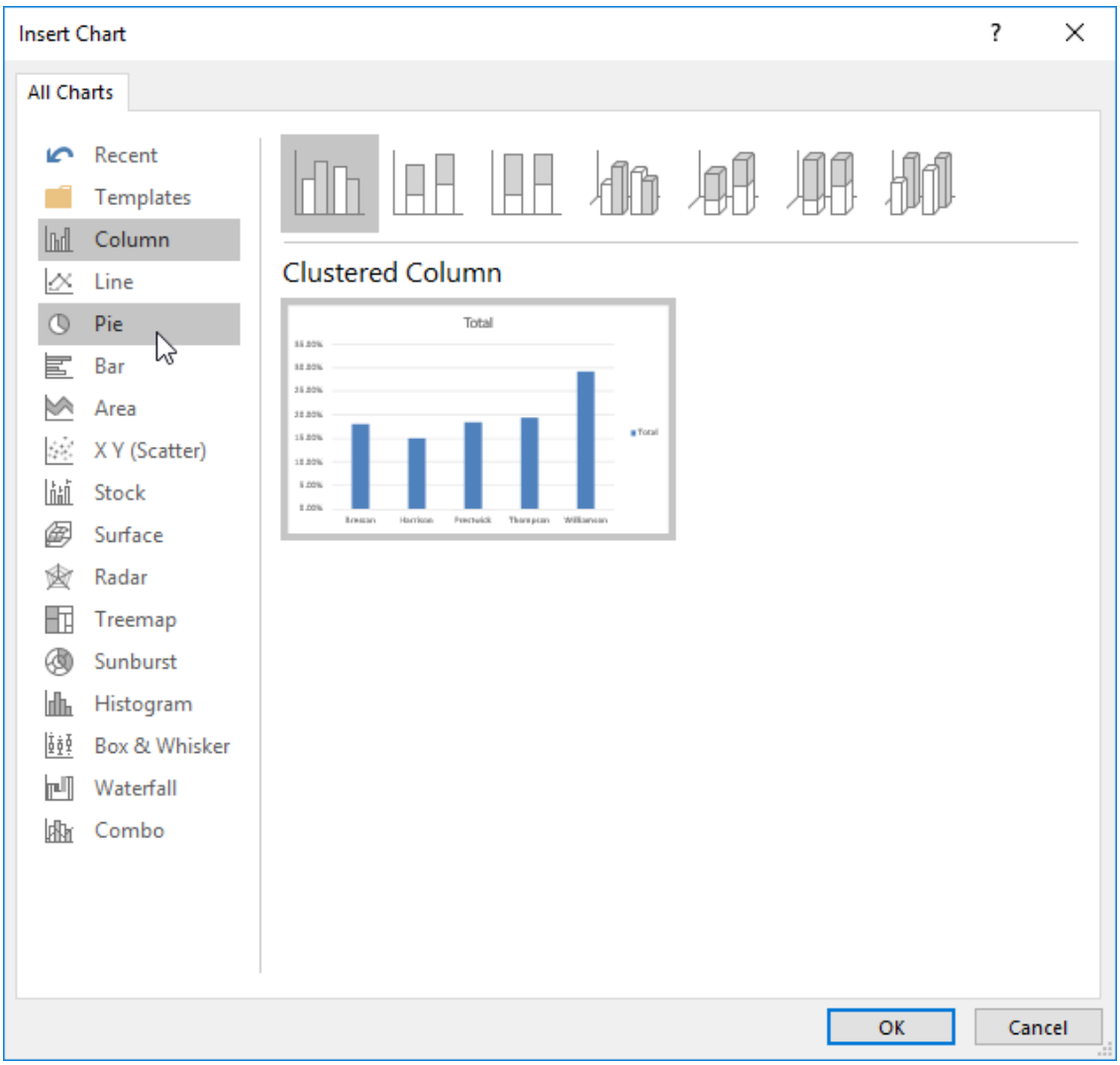
1. To begin, open Activity -3 from your Exercise Files folder:



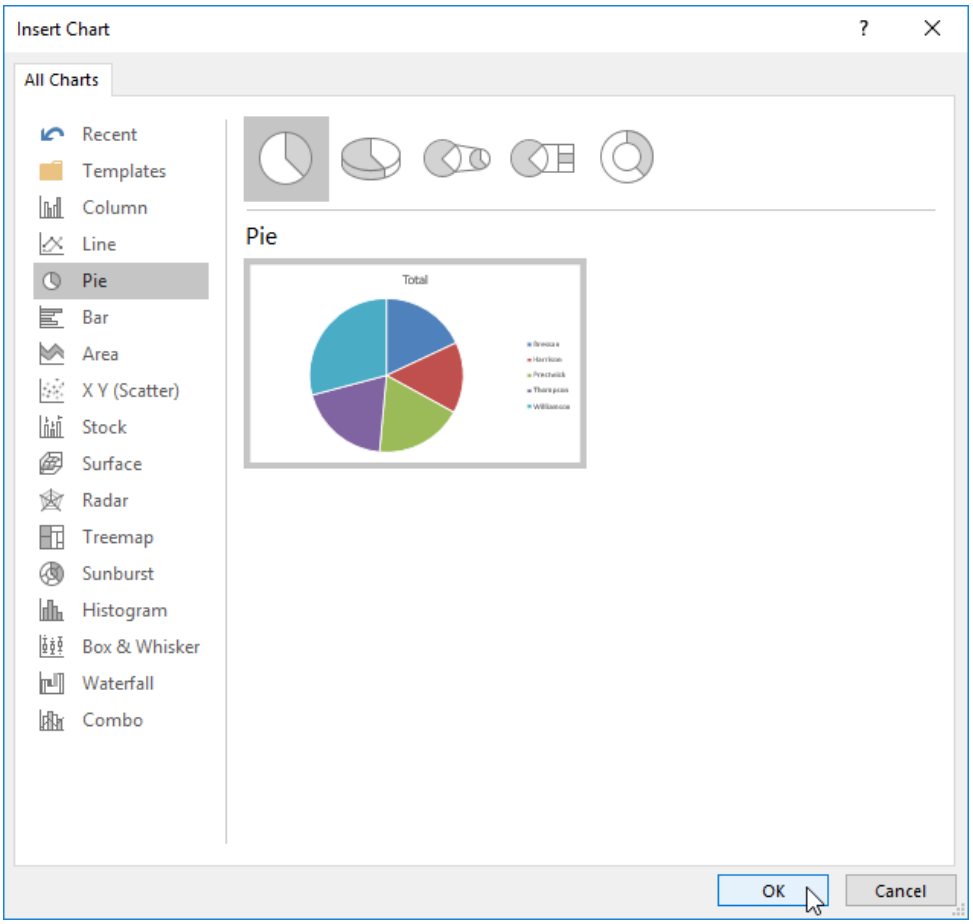
2. Click inside the PivotTable to select it and then click PivotTable Tools – Analyze → PivotChart:



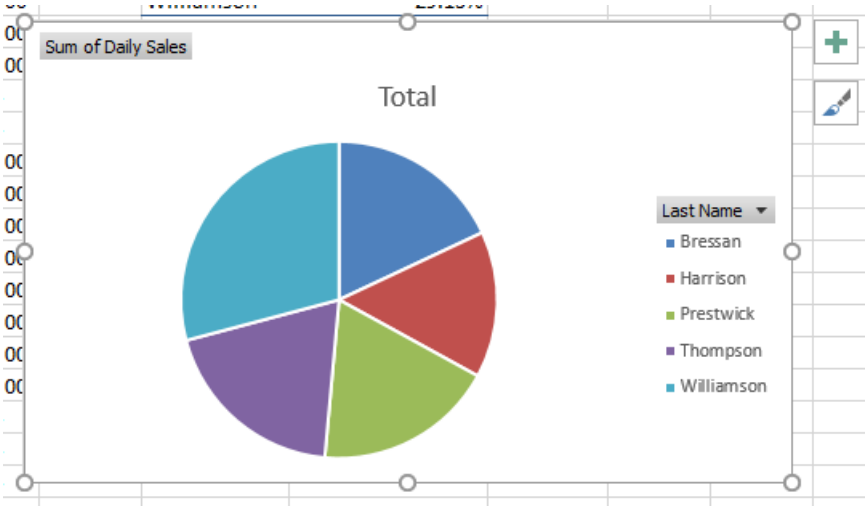
3. The Insert Chart dialog box will now be displayed. For this exercise, click the Pie chart type:



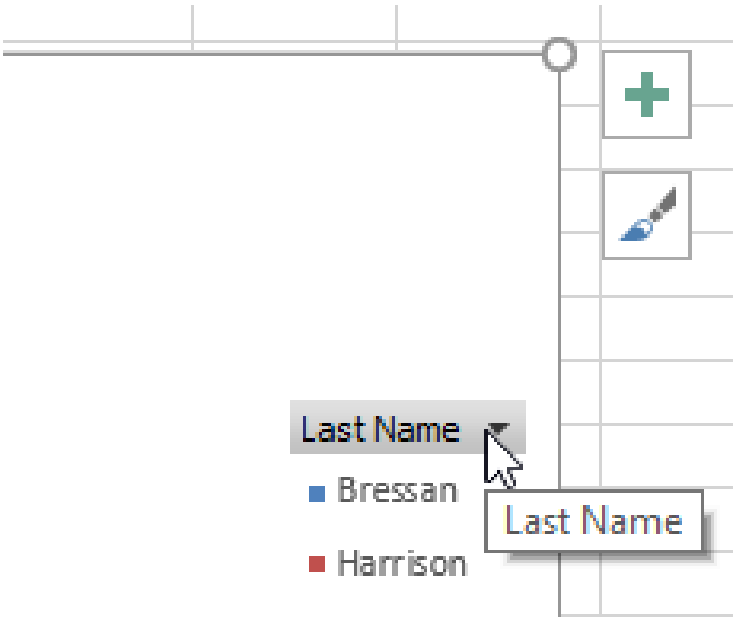
4. With the default pie chart selected, click OK to apply the new settings:



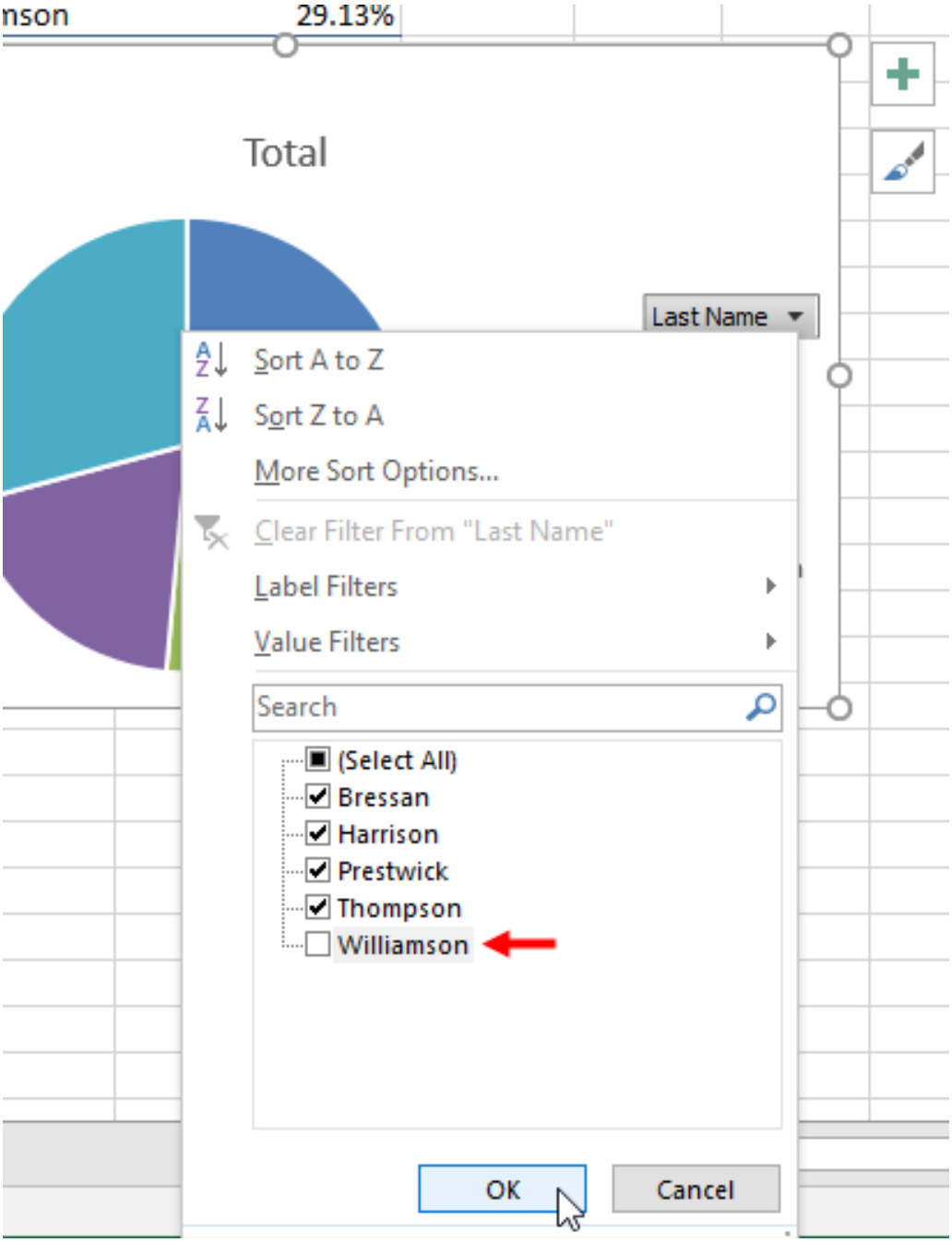
5. The new PivotChart will now appear on your worksheet:



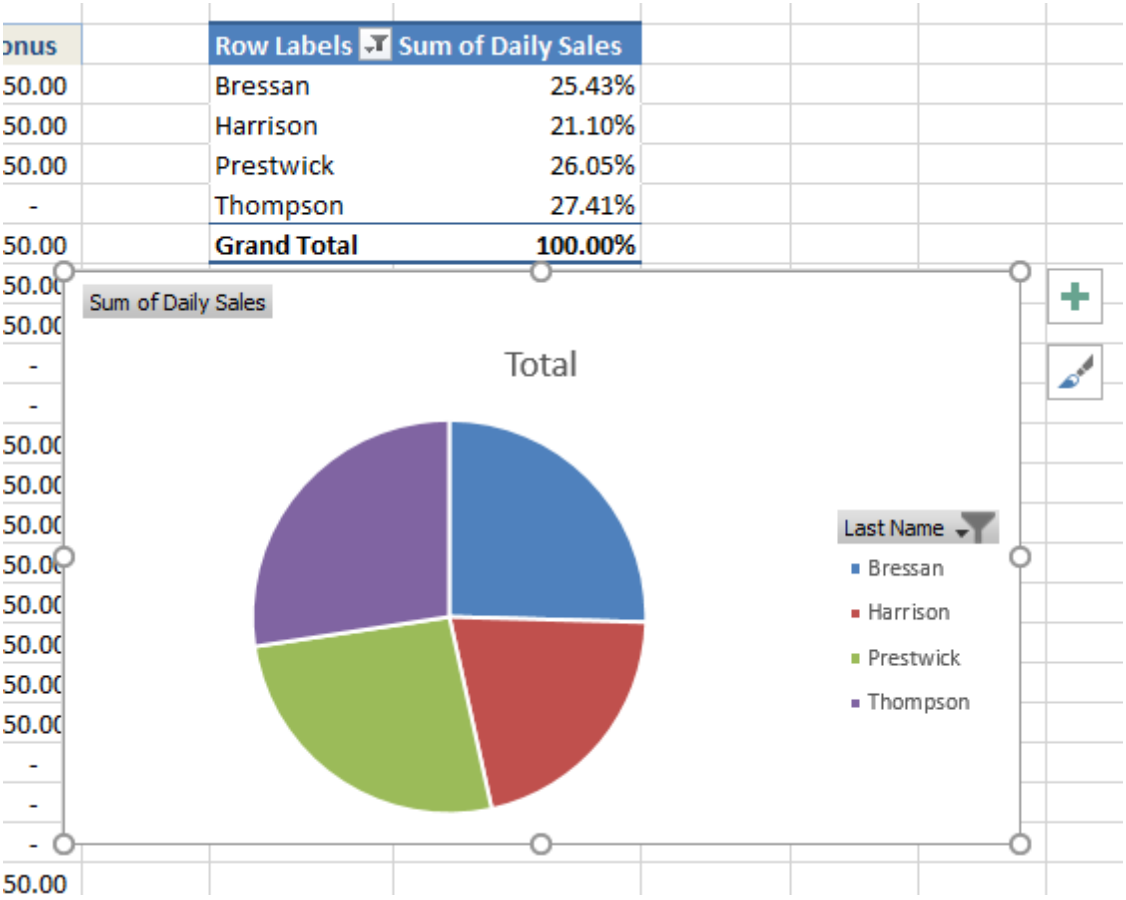
6. As you can see, Williamson generated most of the total sales, so you should filter his results out to focus on the remaining associates. On the PivotChart, click the Last Name drop-down:



7. On the menu that appears, deselect the Williamson checkbox and then click OK:



8. The results for Williamson will no longer be displayed on the PivotChart or the PivotTable:



9. Save your work as Activity -3 Complete and then close Microsoft Excel 2016.

Summary

In this lesson you learned what PivotTables are and how they can be best used to answer many different types of questions you may have of your data. You now know how to insert a PivotTable, as well as add and remove fields from it. Additionally, you are able to generate PivotCharts from a PivotTable, as well as use slicers to selectively filter out unique field entries.

REVIEW QUESTIONS

1. **What is pivoting in Excel?**

2. **What is transactional data?**

3. **What happens to fields that are dragged to the Values area on the PivotTable Field List pane?**

4. **What is the command sequence to insert a PivotChart?**

5. **What do the buttons on a slicer represent?**