Excel Data Skills

LIS 511 Module 8

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Thank you

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Table of Contents

Course Objectives

The primary objective of this class is to familiarize the spreadsheet user with the features of Microsoft Excel. In this class, we will:

Work with datasets and tables

- Create and modify Excel tables
- Sort and filter data

Visualize your Data with Charts

- Use data sparklines to represent your data
- Create basic charts
- Modify and format your charts

Analyze data with PivotTable and PivotCharts

- Create a PivotTable
- How to analyze PivotTable data
- Work with PivotCharts to display your data
- Work with slicers to filter your data

Excel 2016 vs. older versions

The features, practices, and principles covered in this manual will apply to all versions of Excel. Excel 2010 through 2016 should be very similar to the manual images.

Working with Datasets and Tables

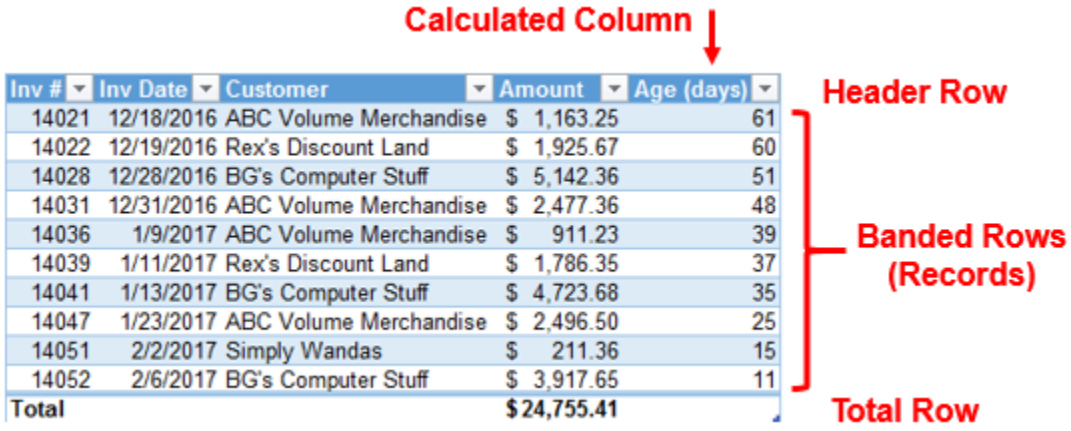
In simplest terms, what we are talking about here is using Excel as a database. A database is a collection of similar information. It could be a collection of business cards, a stack of job application forms or the white pages in a phone book. Today we think of a database as a computerized collection organized so that the computer can quickly organize or find desired pieces of data. A database is an electronic filing system.

The data is often represented as or organized into columns and rows where the columns are the individual elements of information to collect such as name, address, city, state, zip code, etc. The rows are a single set of collected data such as a person's information or the record of one sales transaction. Traditional databases use terms like fields or attributes for the columns, records for the rows, and files for the database or collection. To summarize: a field is a single piece of information; a record is one complete set of fields, and a file is a collection of records. For example, a telephone book is analogous to a file. It contains a list of records, each of which consists of three fields: name, address, and telephone number.

Microsoft Office Excel Table

Previously known as an Excel list in earlier versions, a table typically contains related data in a series of worksheet rows and columns that have been formatted as a table. By using the table features, you can then manage the data in the table rows and columns independently from the data in other rows and columns on the worksheet.

Elements of an Excel tables

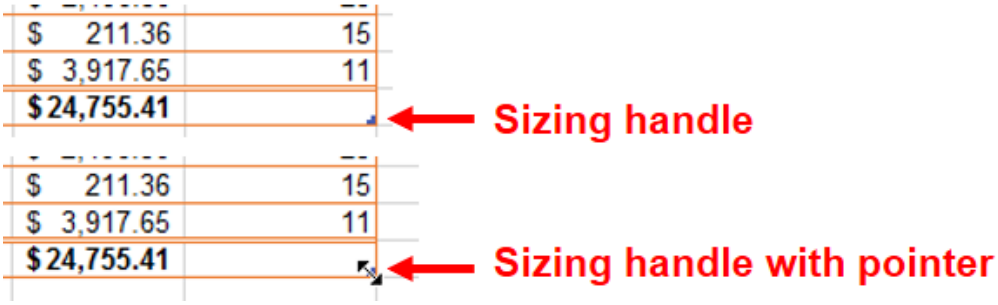


Inv #	Inv Date	Customer	Amount	Age (days)
14021	12/18/2016	ABC Volume Merchandise	$ 1,163.25	61
14022	12/19/2016	Rex's Discount Land	$ 1,925.67	60
14028	12/28/2016	BG's Computer Stuff	$ 5,142.36	51
14031	12/31/2016	ABC Volume Merchandise	$ 2,477.36	48
14036	1/9/2017	ABC Volume Merchandise	$ 911.23	39
14039	1/11/2017	Rex's Discount Land	$ 1,786.35	37
14041	1/13/2017	BG's Computer Stuff	$ 4,723.68	35
14047	1/23/2017	ABC Volume Merchandise	$ 2,496.50	25
14051	2/2/2017	Simply Wandas	$ 211.36	15
14052	2/6/2017	BG's Computer Stuff	$ 3,917.65	11
Total			$24,755.41	

A table can include the following elements:

Header row	By default, a table has a header row of labels. Every table column has filtering enabled in the header row so that you can filter or sort your table data quickly.
Banded rows	These are the data records. By default, when using the **Format as Table** feature, alternate shading or banding is applied to the rows in a table to better distinguish the data.

Calculated columns	In a Table, when you enter a formula in one cell in a table column, you can create a calculated column in which that formula is instantly applied to all other cells in that table column.
Total row	You can add a total row to your table that provides access to summary functions (such as the AVERAGE, COUNT, or SUM function). A drop-down list appears in each total row cell so that you can quickly calculate the totals that you want.
Sizing handle	A sizing handle in the lower-right corner of the table allows you to drag the table to the size that you want.



Things to remember about tables

- One row of labels at the top with a label in every column.
- No blank columns or blank rows. A table is contiguous columns and rows. There can be empty cells but not an entire row or column.
- Usually, better to not include total rows in your table range – they could be interpreted as data rows. The alternative, let Excel add the Total row in Design view after using the **Format as Table** feature.

Create and Modify Data Tables

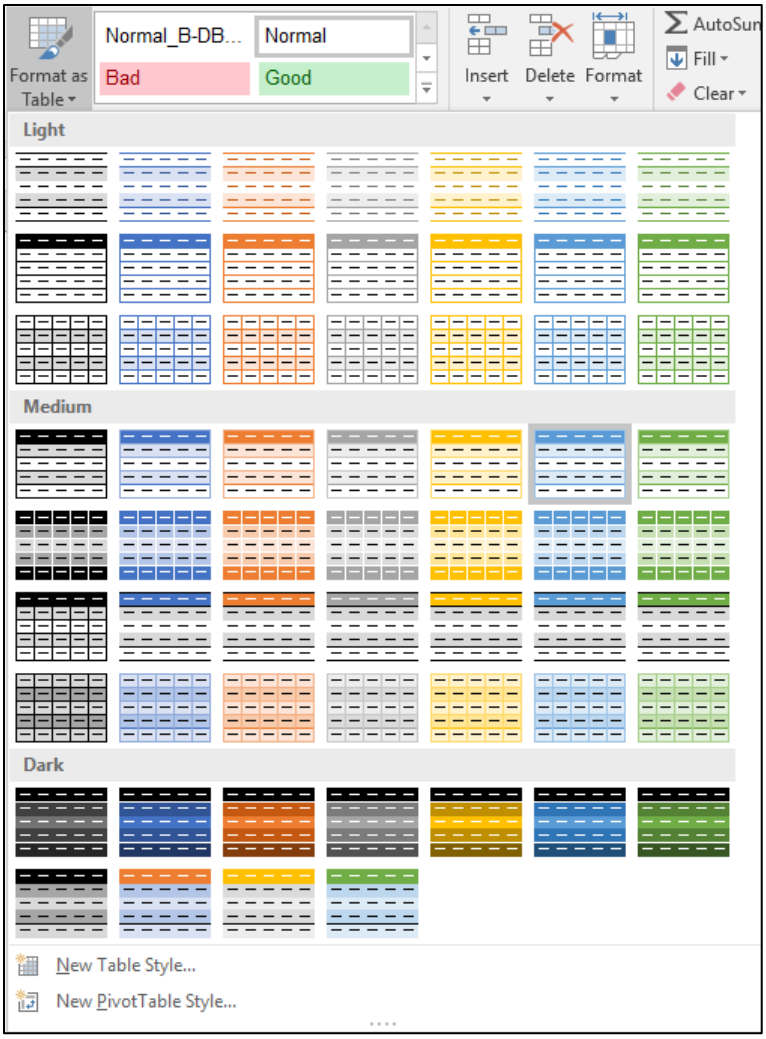
There are two ways to create a data table. They have slightly different results and features. We will look at both in this section.

- **Format as Table** on the **Home** tab – creates and formats a table that can then be modified in the Design tab. This is the new approach with some nice additional features.
- **Filter** in the **Sort & Filter** section of the **Data** tab – creates a table without formatting. This is an older method carried over from the List days.

  The **Home | Sort & Filter** button can also define an Excel table.

Format As Table option

Excel provides numerous predefined table styles that you can use to format a table quickly. If the predefined table styles don't meet your needs, you can create and apply a custom table style. Although you can delete only custom table styles, you can remove any predefined table style so that it is no longer applied to a table.

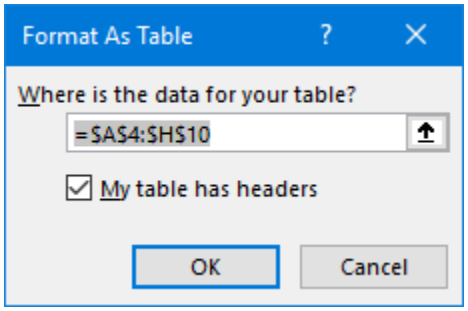


You can further adjust the table formatting by choosing Quick Styles options for table elements, such as Header and Total Rows, First and Last Columns, Banded Rows and Columns, as well as Auto Filtering.

Excel will automatically convert the range to a data table when you select a table style. You can also change the format for an existing table by selecting a different format.

The steps are:

1. Select the range of cells to be formatted.
1. Use the **Home | Format As Table** button to get the style options.
2. Choose the style that you want from the list
3. You will see the **Format As Table** box where you confirm the range and tell the program whether the top row is a header. If you created your own Total row(s) you might want to exclude them from the range
4. Click on OK.



If a single cell is selected, Excel automatically selects the range bounded by blank rows and columns and applies the selected style to that range. Watch the range it selects to make sure any total rows are not included in the range.

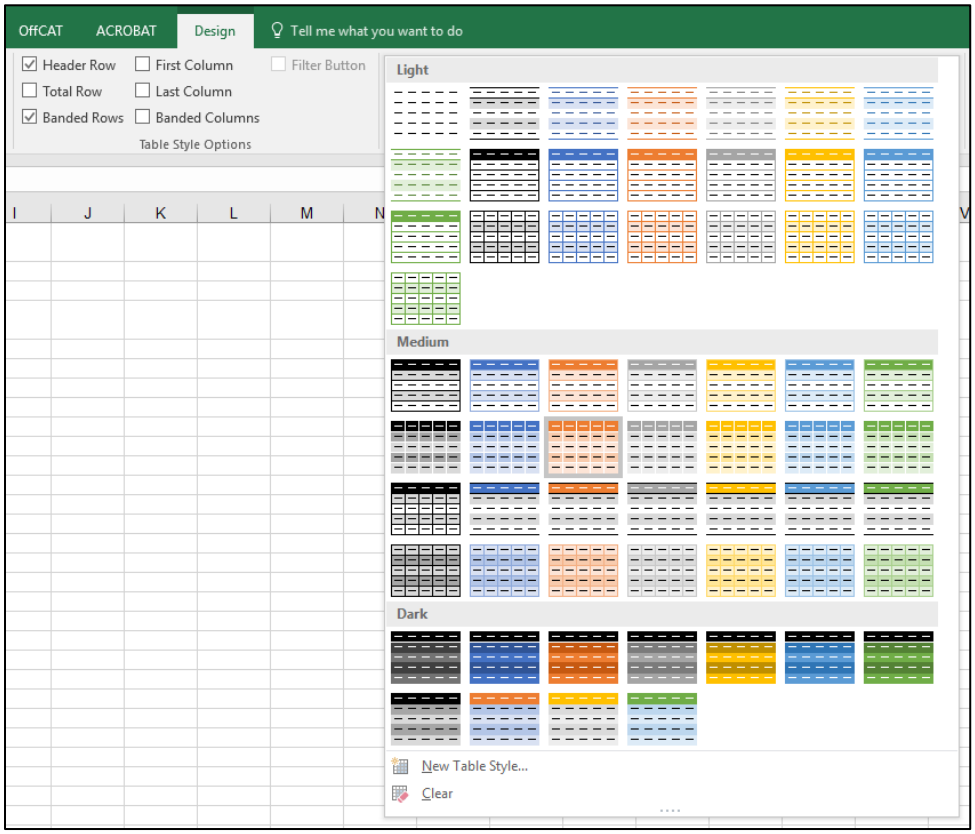
You can clear a table format immediately after choosing it, by using the **Undo** button.

	A	B	C	D	E	F	G	H
1	**Northwest Recreation Company**							
2	**Prepared by: Sally Jones**							
3								
4	Products	Jan	Feb	Mar	Apr	May	Jun	Total Units Sold
5	Camp Stoves	11	55	99	55	11	55	286
6	Two Person Tents	22	66	88	44	22	66	308
7	Four Person Tents	99	88	77	66	55	44	429
8	Two Person Rafts	33	77	77	33	33	77	330
9	Four Person Rafts	44	88	66	22	44	88	352
10	Total	209	374	407	220	165	330	1705
11								

The little buttons added to your headers are part of data tables offering sorting and filtering features (covered later in this section) that are handy for working with lists and tables of data. We'll see how to turn them off in the next section.

To Customize or Remove the Format

Once created, the **Design** tab will let us customize and **Clear** our table format.



Just select your table range, and the Design tab will appear. Note the options on the left side of the menu. Choices made there change the options when you look at the drop-down sample window.

Exercise:

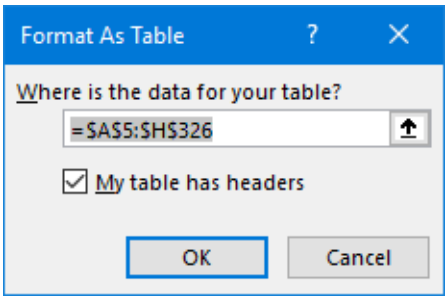
1. Use the **Table Filter and Sort** workbook on the **Format as Table** tab.
2. To demonstrate a cool feature later, in cell H5 type **Years**.

	A	B	C	D	E	F	G	H
1	Database Sample Data							
2	Excel Class					Date:	2/17/2017	
3	Prepared by: your name							
4								
5	ID	Fname	Lname	Hiredate	Dept	Grade	Salary	Years
6	10001	Frank	Sullivan	29835	PROD	20	3452.25	
7	10025	Betty	Selby	29859	PROD	12	2531.65	

3. Select any cell in the table below row 4, the feature will automatically select the entire table.
4. Use the **Home | Format As Table** button to get the style options.

5. When the sample box appears, click the one you think you might like.

   When the **Format As Table** dialogue box appears, make sure that the **My table has headers** box is checked. Note that the range included the Years heading. Click **OK**,



   You should see the **Filter** buttons in row four, and the **Design** tab appeared.

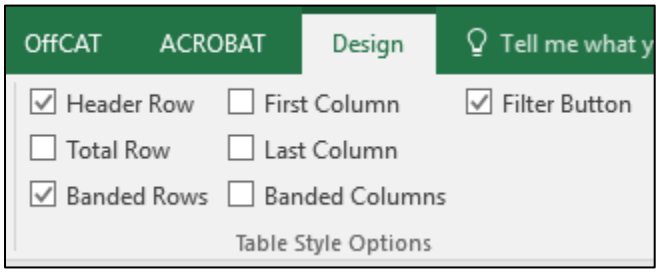
	A	B	C	D	E	F	G	H
5	ID	Fname	Lname	Hiredate	Dept	Grade	Sala	Years
6	10001	Frank	Sullivan	9/6/1981	PROD	20	$3,452.25	
7	10025	Betty	Selby	9/30/1981	PROD	12	$2,531.65	
8	10090	Ken	O'Brien	12/4/1981	MKTG	13	$2,646.72	

6. There is a cool feature of tables defined this way; formulas entered in one cell automatically fill the rest of the column. To see an example, enter the following formula in H6 **=(today()-d6)/365.25**.

   Format the column to the **Comma** format.

	A	B	C	D	E	F	G	H
5	ID	Fname	Lname	Hiredate	Dept	Grade	Sala	Years
6	10001	Frank	Sullivan	9/6/1981	PROD	20	$3,452.25	35.45
7	10025	Betty	Selby	9/30/1981	PROD	12	$2,531.65	35.38
8	10090	Ken	O'Brien	12/4/1981	MKTG	13	$2,646.72	35.21
9	10269	Ray	Duff	6/1/1982	PROD	4	$1,611.05	34.72

7. Select the **Design** tab to see the customization options. If the Design tab isn't showing, make sure that you have a cell pointer anywhere in the table.



You can experiment with any to see what they do – **Do Not** remove the check from the **Header Row** as that may impact formulas. Any other feature can always be reversed by removing or adding the check.

First Column/Last Column – adds Bold to that column

Banded Columns – adds alternate vertical color columns.

Banded Rows – Removes/adds alternating color bands.

Filter Button – Removes/adds filter buttons in the header.

8. Select **Total Row** and note it added a total row to the bottom of the table and assumed you would want to sum the last column. It may need to be wider to display total years of service for the existing workforce.

Note also that the **Header** row automatically replaced the column letters. The letters will reappear if you click outside the table and reappear when you click inside.

	ID	Fname	Lname	Hiredate	Dept	Grade	Salary	Years	I
322	22924	Gerald	Farnsworth	1/23/2017	PROD	4	$1,611.05	0.07	
323	22936	Jay	Stovall	2/4/2017	PROD	3	$1,495.98	0.04	
324	22940	Judy	Somerson	2/8/2017	MKTG	11	$2,416.58	0.02	
325	22945	Dennis	Reed	2/8/2017	PROD	9	$2,186.42	0.02	
326	23262	Zelda	Zoom	2/16/2017	ACCT	16	$2,991.95	0.00	
327	**Total**							**4,930.05**	

9. Click on the total it added and notice a drop-down button appears to the right. Use it and note there is a **None** option. Choose **Average** to see the average years of service.

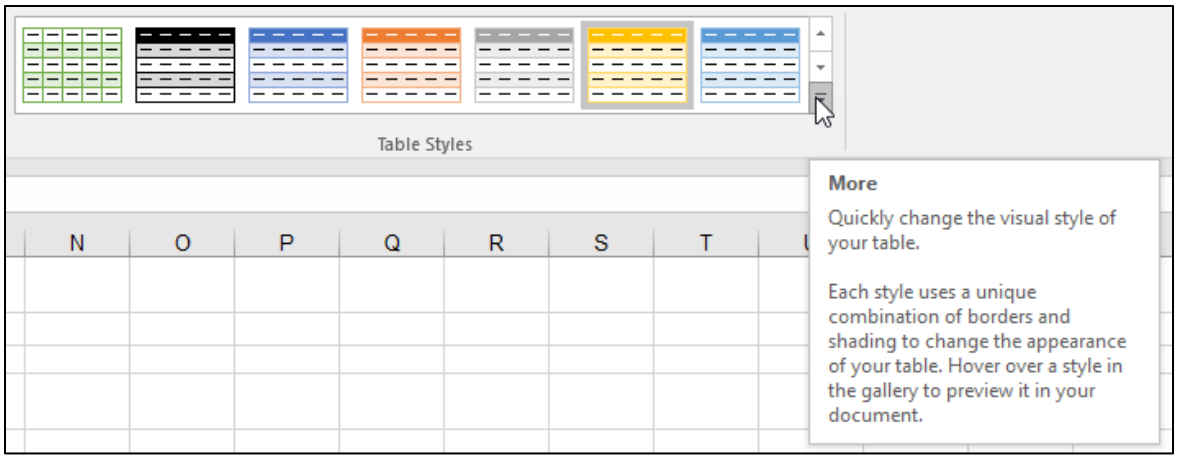
Click in row 327 under **Salary,** and another drop-down button appears with the same choices. Experiment with any of the options, but end up with **Sum** to get total monthly salaries.

While each column offers the same choices, text columns can only be counted (**Count**).

Experiment with the cell below **Hiredate**. You can determine earliest (**Min**), latest (**Max**)and **Average** hiredate.

10. To change the format options, use the **Design** tab.

To see all **Samples**, use the **More** button and then putting your mouse over any of the choices will let you preview it on your table.

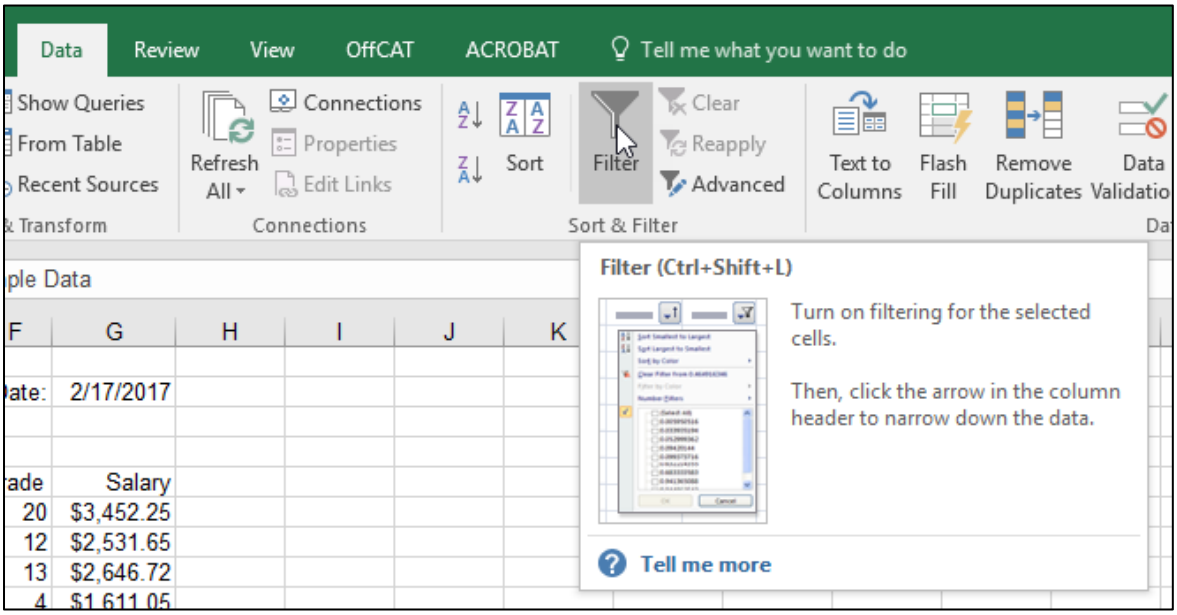


Note the **Clear** option at the bottom of the sample window.

11. Experiment with any of the sample options. We will look at the Filter buttons in a few minutes.
12. Save your work when you are done.

Data | Filter option

You can also create an Excel table by using the **Filter** button in the **Sort & Filter** section of the **Data** tab.



This is an older method that is part of the **Data** toolset which is a little different than the **Format as Table** option. In this exercise, we will look at creating a table. Point out a few differences and then move on to Sorting and Filtering.

Exercise:

1. Use the **Table Filter and Sort** workbook on the **Data Sort and Format** tab.
2. Like before, select any cell in the table below row 4, the feature will automatically select the entire table.

Note: We didn't add the **Years** column. While this feature would include the new column, it would not automatically propagate our formula into the entire column – difference number one.

3. Use the **Data** tab and click on the **Filter** button a couple of times. It is toggle turning the feature on and off. Leave it with the filter buttons showing.

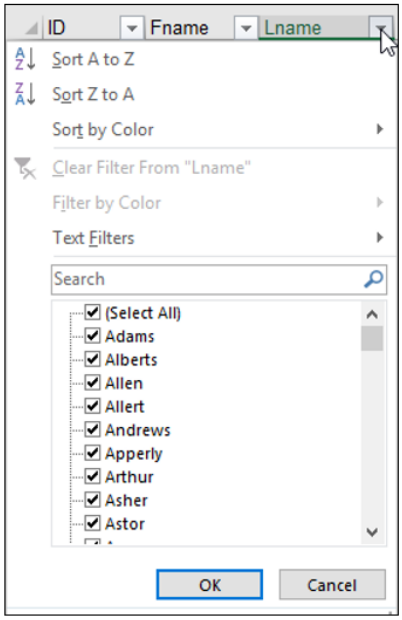
   Note that no formatting occurred and the Design tab is not visible. This table feature is for filtering and sorting.

4. Save your work.

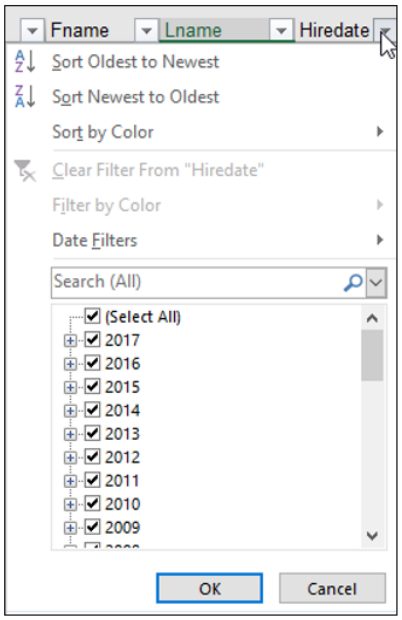
Sort and Filter Data

Either of the methods for defining our Excel table will work the same with the Sort and Filter options. The Filter button that appeared in the Header row is the way we access the menu of features. While they are the same, the sixth item on the menu is different for Text, Numbers, and Dates.

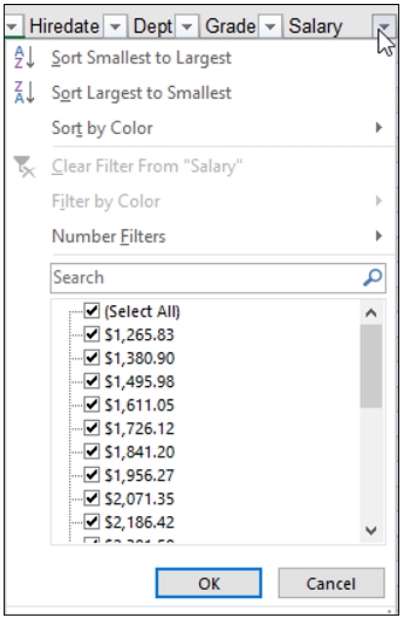
Text Columns



Number Columns



Date Columns



Each offers three types of sorts, two types of filters, a search, and at the bottom a Select All option plus each unique value currently in that column. The checks mean those items are currently displayed.

Quick Filters

Quick Filters are by far the easiest to use, requiring only that you select what you want from the choices at the bottom of the **Filter** menu.

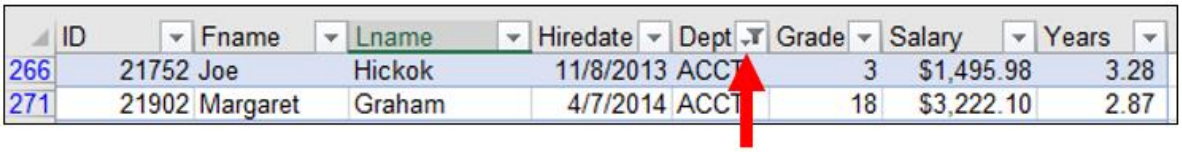
Exercise:

1. Use the **Table Filter and Sort** workbook and either of the **Format As Table** or **Data Sort and Format** tabs.

2. Click on the **Filter** button in the **Dept** column and look over the options. Notice there are only five choices in the bottom of the menu.

   Remove the check from **(Select All)**, check **ACCT**, and click OK. You now have a list of only the accountants. If you look at the row numbers, you can tell that it accomplished this by hiding the rows of other departments.

3. Look at the Header row and note the little symbol in the **Dept** filter button is indicating that there is a filter in place.



	ID	Fname	Lname	Hiredate	Dept	Grade	Salary	Years
266	21752	Joe	Hickok	11/8/2013	ACCT	3	$1,495.98	3.28
271	21902	Margaret	Graham	4/7/2014	ACCT	18	$3,222.10	2.87

4. Click on the **Filter** button in the **Grade** column and look over the options. Notice there are choices in the bottom of the menu seems to be an incomplete list of numbers. The company has pay grades 1-24. Why do you suppose some are not showing? Because of the filter on Dept, these are the only Grades present.

5. Remove the check from **(Select All)**, select **3**, and click OK. You now have a list of only the accountants that are grade 3.

   The Header row confirms that there are now two filters in place.

6. Cool feature: Select the table area including **Header** and **Total** rows and do a Copy.

   In cell A340 do a regular **Paste**. While our table has hidden rows, the copy does not, nor does it have Filter buttons.

	A	B	C	D	E	F	G	H
340	ID	Fname	Lname	Hiredate	Dept	Grade	Salary	Years
341	11582	Georgia	Robertson	1/4/1986	ACCT	3	$1,495.98	31.12
342	15602	Leslie	Perkins	1/6/1997	ACCT	3	$1,495.98	20.11
343	19932	Beverly	Murray	11/14/2008	ACCT	3	$1,495.98	8.26
344	21752	Joe	Hickok	11/8/2013	ACCT	3	$1,495.98	3.28
345	**Total**			**6/9/2001**			**$5,983.92**	**15.69**
346								

   This paste could have been in another sheet, another workbook, or even in Word or Outlook. In the last two, it would create a table that might require some resizing of columns.

7. Use the **Filter** button for **Dept** and choose the **Clear Filter From "Dept"** option to get a list of all grade 3 employees. Choosing **(Select All)** down in the menu would have had the same result.

   Use the (Select All) to display all pay grades – remove the filter.

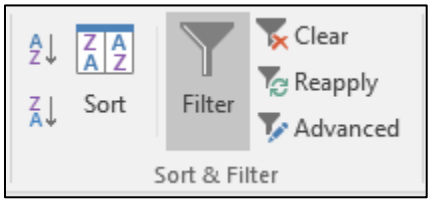
8. Look over each of the other Filters and notice that the first four columns have many filter choices because there are so many unique values in each column. The Salary column has only 24 because it is related to Grade.
9. Clear any filters and save your work.

Clearing multiple filters

The Data tab offers a couple of ways to clear multiple filters. The Data tab can be used regardless of how you defined your table – whether your table is formatted or not.

Exercise:

1. Use the **Table Filter and Sort** workbook and either of the **Format As Table** tab.
2. Click on the **Filter** button in the **Salary** column, remove the check from **(Select All)**, select three of the smaller salaries, and click OK. You now have of employees in those grades. We could set other filters.
3. Click on the Data tab. Clicking on the **Clear** button would remove all in place. This is handy if you have set filters on several columns.



While a rather crude approach, clicking on the **Filter** button would also clear the filter but also turn off the Filter feature, so we would click on it twice to clear the filters.

Click on the **Clear** button and see the filters are gone.

Click on **Undo** to see that the filter is back in place. Try clicking on the **Filter** button to clear the filter and again to turn the feature back on.

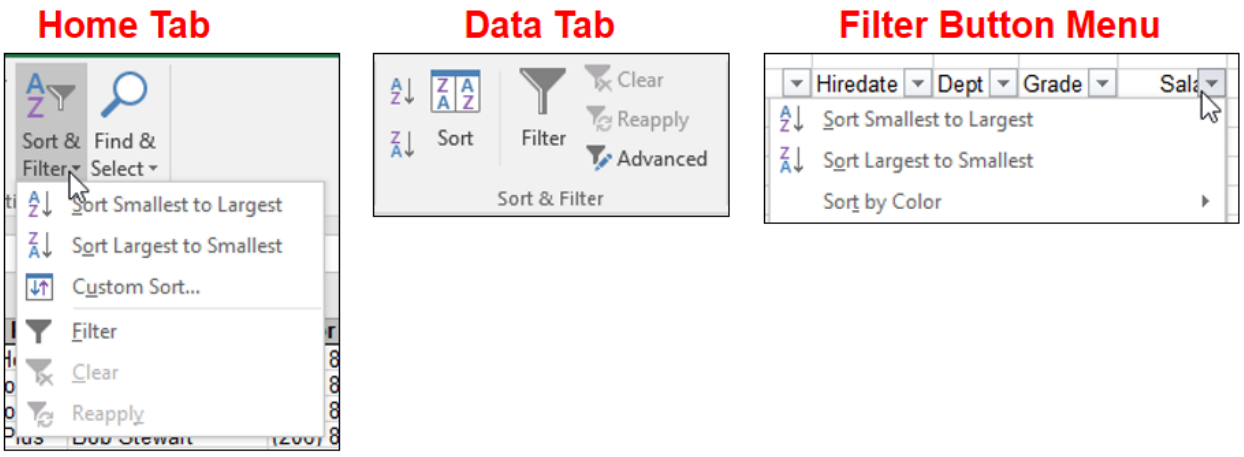
Quick Sorting a list

Quick Sort allows you to sort your list data in ascending and descending order. Each sort performs a simple sort of the rows based on the data in the column the pointer is in.

To sort your list with the quick sort buttons, your list must contain no blank rows or columns – individual blank cells are OK. The quick sort buttons will automatically select all contiguous rows and columns, ignoring a row of column headings like row 5 below.

There are three places to find quick sort options. This first two option don't require defining a table in advance.

- The **Home | Sort & Filter** button.
- **Data | Sort & Filter | Sort** buttons
- **Filter** button menu on any Excel table.



Warning: If Excel can't differentiate the column headings from the data, it might sort it in with the data. The same is true if you have a row of totals at the bottom.

The steps would be:

1. **Good Practice** – check to see if the data is already sorted on any of the columns. This would allow you to return to the original order if necessary. If not, consider working on a copy of the data.
2. Select any single cell within the list.
3. Click on either quick sort button.
4. Look over the result to make sure that your headings and totals didn't get included – if so, use Undo.

If you need to sort by more than one column, sort by the least important columns first.

To perform more complex sorts, such as sorting one field in ascending order and a second field in descending order, use Data | Sort from the menu.

Exercise:

1. Use the **Table Filter and Sort** workbook and either of the **Format As Table** or **Data Sort and Format** tabs.
2. Notice that our data is sorted by **ID** (first column) in case we want to return to the original order.
3. Use the **Filter** button in the **Lname** (C) column and choose the first sort option – **Sort A to Z**.

   Use the **Filter** button in the **Dept** (E) column and choose the first sort option – **Sort A to Z**.

   The table is sorted by department and then by the last name within the department
4. Use the **Filter** button in the **Salary** (G) column and notice the sort options have slightly different labels with number data. Choose the first sort option – **Sort Largest to Smallest**.

If you look, you'll see that people making a particular salary are arranged by department and then by the last name.

5. Sort on **Hiredate** using **Oldest to Newest,** and that also returned our data to the original order.
6. Experiment with any others.
7. Change to the **Personnel** tab and note that we haven't defined a table.
8. Click on cell B10 and use the Sort A to Z  button on the Data tab. Note it recognized our labels at the top and left them unsorted.

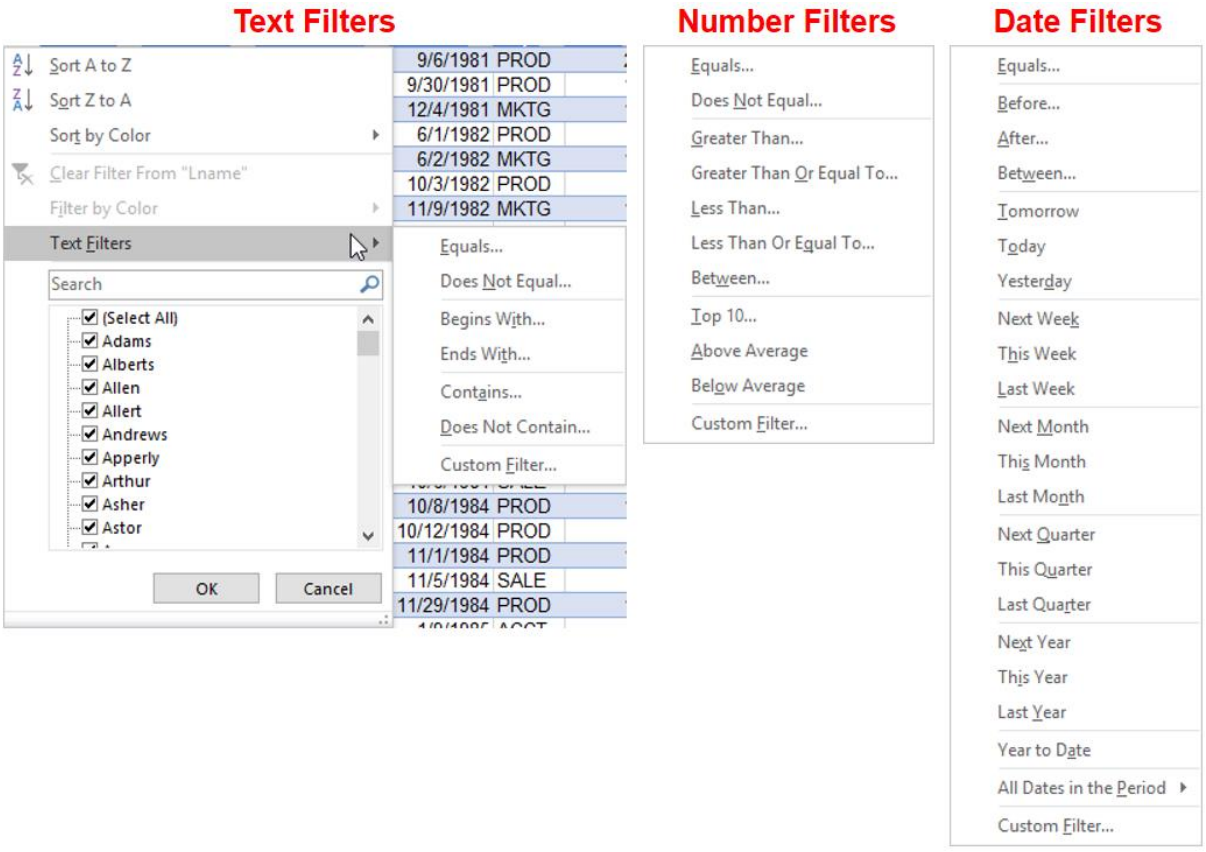
   Click on the **Sort Z to A**  button. What happened?
9. Sort any other column using the sort buttons on the **Home | Sort & Filter** button.
10. While anywhere in the Personnel data, choose Filter on the **Home | Sort & Filter** button. Note it defined an Excel Table with Filter buttons.

Some mistakes not to make

When things go wrong, or even if they don't feel quite right, remember that the **Undo** feature is your only true friend. But, only if you act quickly. Once you Save or start doing too many other things, it may be too late.

Custom AutoFilters

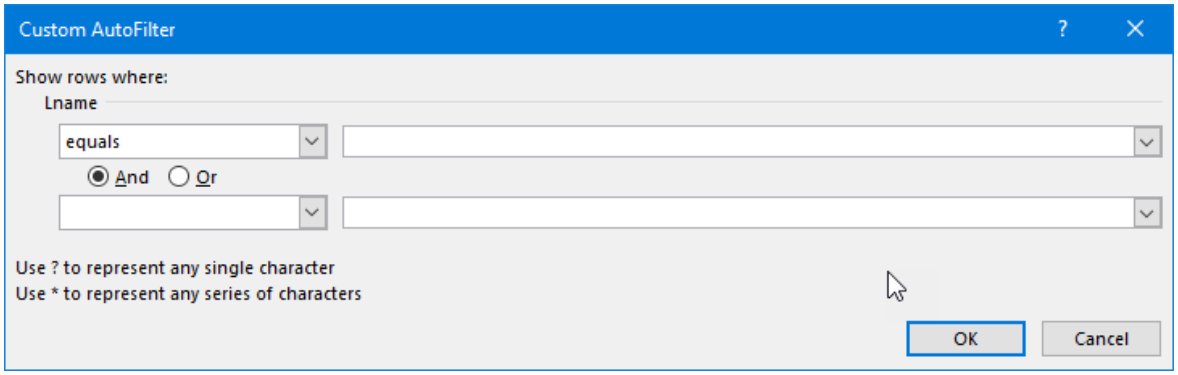
Each data type **Filter** button menu has a more filter option called **Text Filters**, **Number Filters**, and **Date Filters** in the on the menu.



Exercise:

1. Use the **Table Filter and Sort** workbook and either of the **Format As Table** or **Data Sort and Format** tabs.
2. Clear any existing filter.
3. Using the **Filter** button on **Lname**, choose **Text Filters** and then **Equals**.

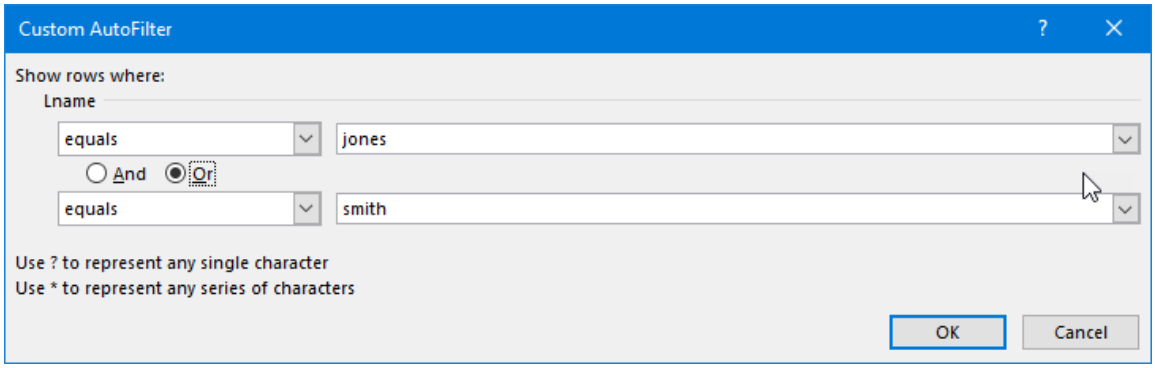
   When the **Custom AutoFilter** box appears, look at the drop-down buttons.



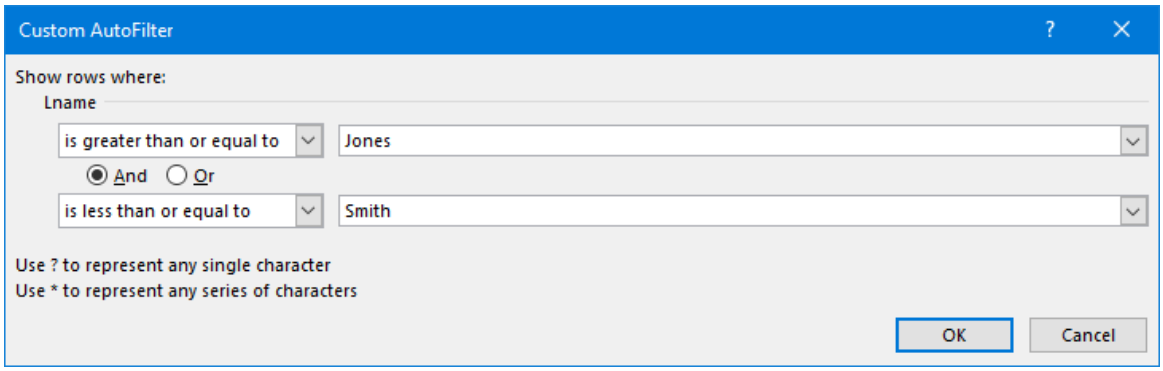
The two smaller boxes allow you to choose **Comparison** operators, while the larger ones contain the unique values in that column. This last option is handy when the field contents are longer and complex.

Set the small top box to **equals** and in the larger box to the right, type **jones**. It is not case sensitive. Click **OK**.

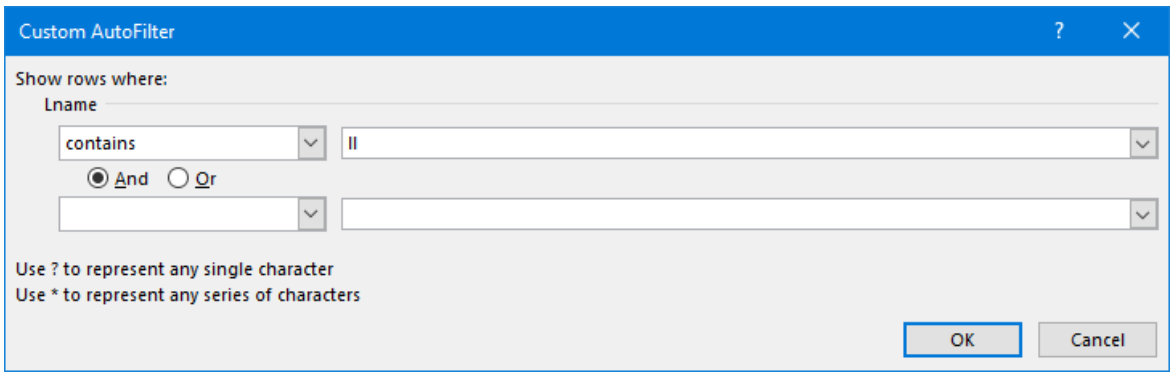
4. Suppose we had two names we are interested in; the following is an example. We use the **Or** option because a person can't be both Smith and Jones. Try it.



5. An example of **And** operator might look like this. Try it to get all names between those two including both names.

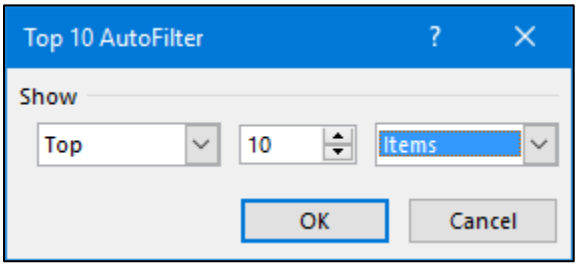


6. One more example, suppose we wanted all names containing two Ls side-by-side. Choose the **Contains** option and make the following entries. This would work for letter or number sequences in part numbers, license plates, etc.



We have not been clearing filters because we stayed in the same column, but unless we want two filters we would clear the filter before going to a new column.

7. Clear your filter, then using the **Filter** button on **Salary**, choose **Text Filters** and look over the options. The first two groups should be self-explanatory. Choose **Top 10** and look over options in the **Top 10 AutoFilter** box.



   As with most of the options, **Top 10** is a type of filter that then lets you customize it to meet your needs. You can choose Top/Bottom. Items/Percent, and set the number to anything you want. Use the displayed choices and click OK.

   Note we got more than 10 rows because there were so many people in the third highest salary.

   Run it again, changing the **Items** to **percent**.

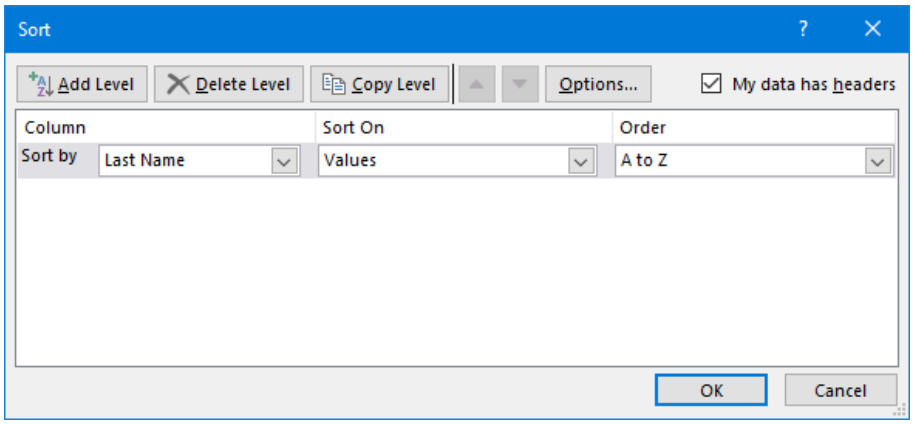
8. Experiment with a couple of other options for **Salary**.
9. Clear your filter, then using the **Filter** button on **Hiredate**, choose **Text Filters** and look over the options. The most should be self-explanatory. Choose **Year To Date**.
10. Experiment with a couple of other options and save your work

Using Data | Sort (optional)

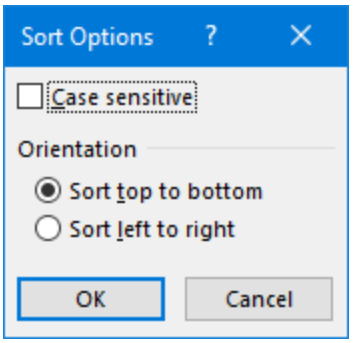
We saw earlier that you could use **Quick Sort** to sort on multiple columns. An alternative is to use **Data | Sort** from the menu. Like the other sort options it doesn't require an Excel table, but also like the others if Excel can't recognize your labels at the top and your totals at the bottom, they could get sorted:

For best results, the list you sort should have column labels.

1. Click a cell in the list you want to sort.
2. Choose **Data | Sort**.



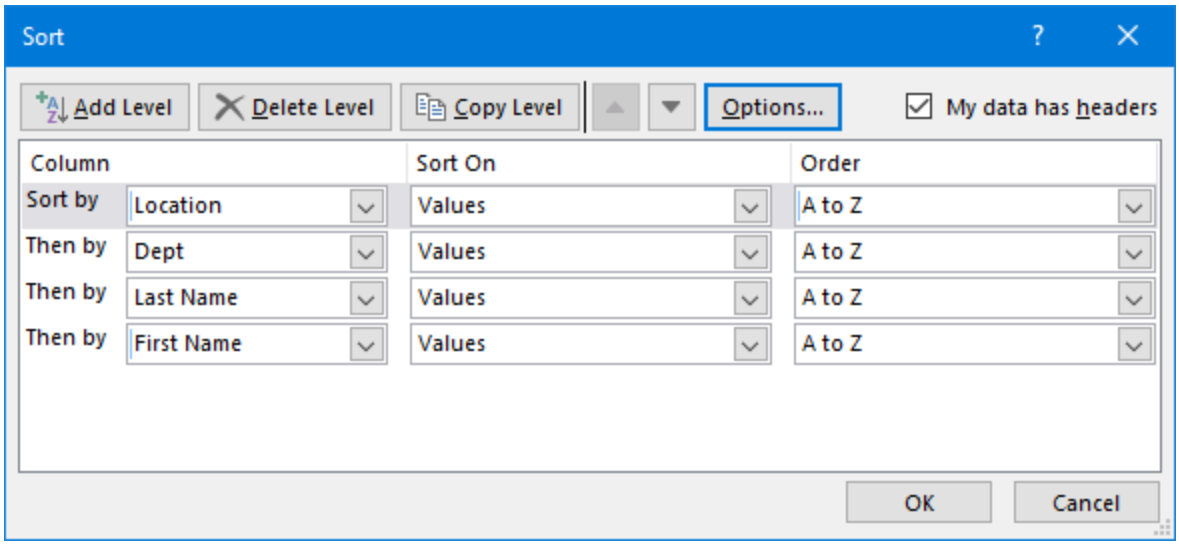
3. You choose the most important **Column** to sort, what to **Sort On**, and finally the **Order**. There are drop-downs to help you make your choices.
4. Use the **Add Level** button to choose the next less important sort until you have defined what you want. Useful if the previous level has duplicate values.
5. The **Options** button offers choices of case sensitive and also offers the option of sorting columns left to right.



6. Then click OK.

Exercise:

1. Use the **Table Filter and Sort** workbook and the **Personnel** tab.
2. Click anywhere in the data and choose **Data | Sort**. Look over the drop-down choices. Note it even tried to guess a logical first column to sort on.
3. Make sure that **My data has headers** is checked in the upper-right corner.
4. Make the following selections using the **Add Level** button for each new sort.



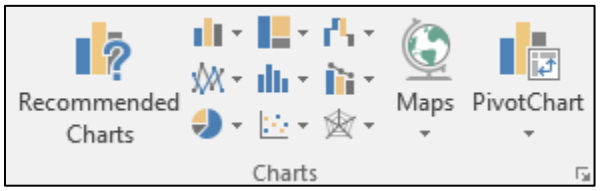
5. Click OK and look at the results.

   You should see the people are in **Location** then **Dept** then **Last Name** then **First Name** order. If you scroll down to around row 250, you will find two Jones working in production in Seattle and they are in fact sorted by first name.

Visualize Your Data with Charts

In Excel, charts and diagrams can show trends, averages, high and low points, and more. Not only do they make your worksheets more visually appealing, they also make it easier for your audience to sort out and understand the information you are presenting. This is especially true when dealing with data.

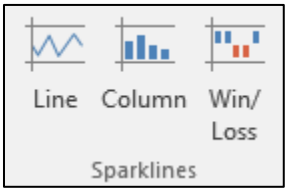
There are many types of charts available in Excel as well as variations of each. Excel includes several tools to help you create them. You'll find those tools under the **Insert** tab in the **Charts** group on the ribbon.



Charting with Excel has almost as many variations as people have visions of what they want to do with them. While we will cover the fundamentals, another source for getting ideas or learning about specific features is **YouTube**. There are hundreds of short videos. Search for **Excel Charts** or **Excel 2016 Charts** – using your version year.

Using Sparklines to show data trends

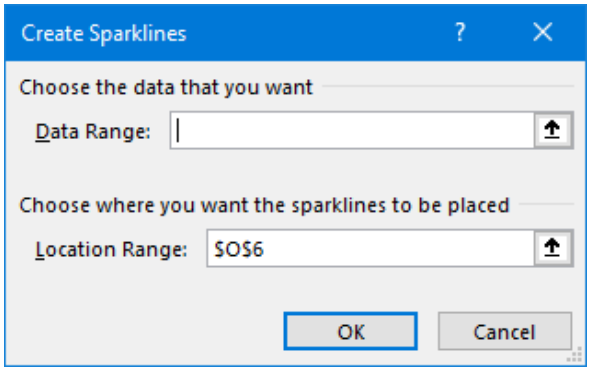
While not really a charting feature, many organizations use sparklines to show data trends. Introduced in Excel 2010, a sparkline is an easy to produce a tiny chart in a worksheet cell that shows a visual representation of data. You'll find sparklines under the **Insert** tab in the **Sparklines** group (next to **Charts**) on the ribbon.



Data presented in a row or column is useful, but patterns can be hard to spot at a glance. Sparklines near your data can add context for these numbers. They take up a small amount of space but can visually display a trend in adjacent data.

Creating a sparkline

1. Select an empty cell or group of empty cells for one or more sparklines.
2. Using the **Insert** tab, in the **Sparklines group**, click the type of sparkline that you want to create: **Line**, **Column**, or **Win/Loss**.
3. In the **Create Sparklines** box, select or type the range of the cells that contain the data to base the sparklines. Note: Don’t include both data and totals.

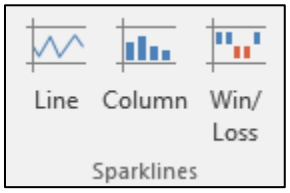


4. Confirm the location where you want the sparkline and click OK.

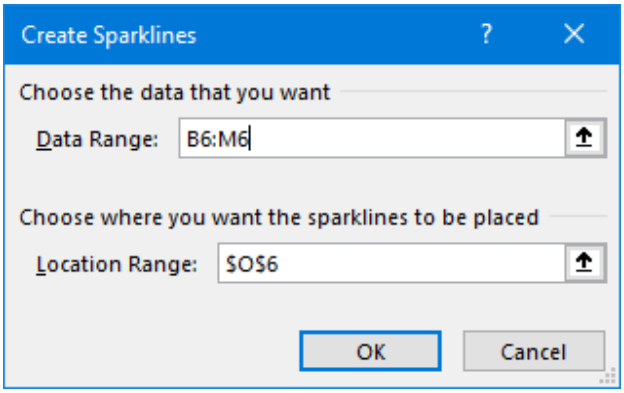
Once created, when one or more sparklines are selected, the **Design** tab appears with the **Sparkline Tools**.

Exercise:

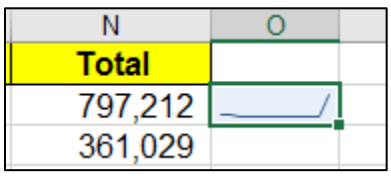
1. Close any workbooks and open **Charting Exercise**.
2. Choose the **Sparklines** tab and look over the data. We are going to add sparklines to the right of our totals in column 0
3. Click in cell **O6** and choose the **Insert** tab. Look for the **Sparklines** group to the right of the Charts group.



4. Click on the **Line** option and the **Create Sparklines** box will appear.



5. Use your mouse to select the data in row 6 as shown above. Do not include the label or the Total column. The label would display as zero and the total, since it is the sum of the data would get what is called a headstone effect on our sparkline. We already have a bit of that since our first employee had a huge December.



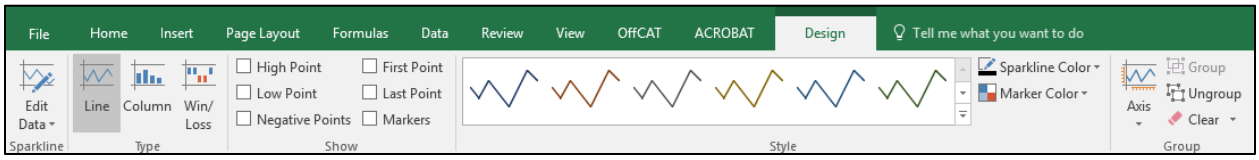
6. AutoFill **O6** down to row **30** – we include the **Totals** row so we can compare individual trends to the company trend.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	**Employee**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**	
6	Anida	65,375	75,427	64	6,426	4,242	642	5,315	513	6,414	2,523	5,645	624,626	797,212	
7	Anna	35,253	95,737	624	35,253	4,242	35,253	35,253	44,242	4,242	424	35,253	35,253	361,029	
8	Brad	65,375	75,427	64	6,426	4,242	642	5,315	513	6,414	2,523	5,645	624,626	797,212	
9	Brad	79,769	27,386	79,769	79,769	79,769	4,624	79,769	79,769	79,769	3,563	7,467,467	464	8,061,887	
10	Brendan	86,868	98,653	79,959	79,959	79,959	79,959	23,562	79,959	86,585	79,959	653,636	43,427	1,472,485	
11	Donald	79,769	27,386	79,769	79,769	79,769	4,624	79,769	79,769	79,769	3,563	7,467,467	464	8,061,887	
12	Helen	57,890	63,663	246	57,890	57,890	62,462	57,890	7,777	7,453	525	2,352	1,242	377,280	
13	Joana	6,446	45,637	69,869	456,464	52,353	13,451	9,869	69,869	13,513	69,869	2,535	68,686	878,561	
14	Joanne	95,959	74,636	436,346	6,464,236	95,959	95,959	56,007	342,464	6,246	4,324,356	95,959	865,636	12,953,763	
15	Joel	99,579	52,354	99,579	99,579	99,579	99,579	99,579	686,846	99,579	63,463	99,579	86,868	1,686,163	
16	John	6,446	45,637	69,869	456,464	52,353	13,451	9,869	69,869	13,513	69,869	2,535	68,686	878,561	
17	Jonarthan	79,769	27,386	79,769	79,769	79,769	4,624	79,769	79,769	79,769	3,563	7,467,467	464	8,061,887	
18	Meg	65,375	75,427	64	6,426	4,242	642	5,315	513	6,414	2,523	5,645	624,626	797,212	
19	Patrick	56,346	23,424	524,624	64,642	56,346	56,346	56,346	6,462	141,341	56,346	513,513	757	1,556,493	
20	Peter	95,959	74,636	436,346	6,464,236	95,959	95,959	56,007	342,464	6,246	4,324,356	95,959	865,636	12,953,763	
21	Rebecka	84,678	76,956	84,678	434,364	84,678	5,353	523,523	6,436	6,464	84,678	8,686	41,451	1,441,945	
22	Robert	6,446	45,637	69,869	456,464	52,353	13,451	9,869	69,869	13,513	69,869	2,535	68,686	878,561	
23	Sara	86,868	98,653	79,959	79,959	79,959	79,959	23,562	79,959	86,585	79,959	653,636	43,427	1,472,485	
24	Susan	47,357	6,346	6,346	43,636	453,464	5,235	35	47,357	13	54,252	47,357	47,357	758,755	
25	Susan	86,868	98,653	79,959	79,959	79,959	79,959	23,562	79,959	86,585	79,959	653,636	43,427	1,472,485	
26	Ted	95,959	74,636	436,346	6,464,236	95,959	95,959	56,007	342,464	6,246	4,324,356	95,959	865,636	12,953,763	
27	Theodore	35,253	95,737	624	35,253	4,242	35,253	35,253	44,242	4,242	424	35,253	35,253	361,029	
28	Timothy	99,579	52,354	99,579	99,579	99,579	99,579	99,579	686,846	99,579	63,463	99,579	86,868	1,686,163	
29	William	56,346	23,424	524,624	64,642	56,346	56,346	56,346	6,462	141,341	56,346	513,513	757	1,556,493	
30	**Total**	1,575,532	1,455,212	3,338,945	22,195,400	1,853,212	1,039,311	1,487,370	3,254,392	1,081,835	13,820,731	26,030,811	5,144,323	82,277,074	

7. Experiment with making the O column wider to see the trends better.
8. Save your work and leave the file open.

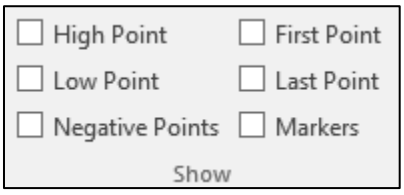
Customizing your sparkline

Once created, when one or more sparklines are selected, the **Design** tab appears with the **Sparkline Tools**.

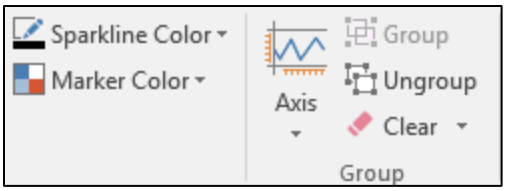


Exercise:

1. Use the workbook from the last exercise.
2. Select your **Sparklines** (cells O6:O30) and note that the Design tab appears in the ribbon. Here is where we are going to experiment.
3. Use the **Show** options and as you select options to try to notice the samples in the **Style** group, as well as your sparklines, show you an example of the result. As with **Format As Table** earlier, checking a box turns the feature on and removing the check takes it off.



4. When you find a combination that you like, use the drop-down button in the **Style** section to see different colors and density using Excel's color theme.
5. Finally, at the right-end of the **Design** ribbon, you can choose a **Sparkline Color** and Marker Color (not limited to the sheet theme).



This is also where you can Clear your sparkline from the selection

Create Basic Charts

Excel supports many types of charts to help you display data in ways that are meaningful to your audience. When you create a chart or change an existing chart, you can select from a variety of chart types (such as a column chart or a pie chart) and their subtypes (such as a stacked column chart or a pie 3-D chart). You can also create a combination chart by using more than one chart type in your chart.

Basic Chart elements

A chart has many elements. Many are displayed by default; others can be added as needed. You can change the display of the chart elements by moving them to other locations in the chart, resizing them, or by changing the format. You can also remove chart elements that you do not want to display.

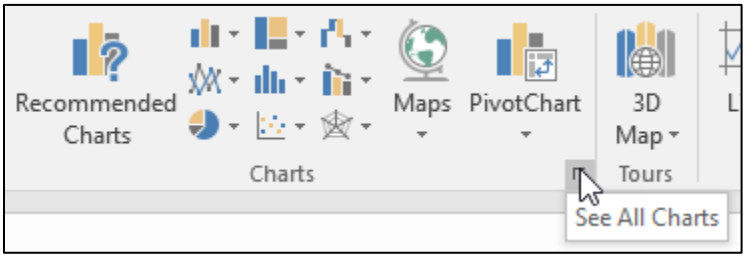
A chart and its elements

1. Chart area of the chart.
2. Plot area of the chart.
3. Data points of the data series that are plotted in the chart.
4. Horizontal (category) and vertical (value) axis along which the data is plotted.
5. The legend of the chart.
6. Chart and axis title.
7. Data label that you can use to identify the details of a data point in a data series.

Steps to create a basic chart

For most charts, such as column and bar charts, you can plot the data that you arrange in rows or columns on a worksheet into a chart. However, some chart types (such as pie and bubble charts) require a specific data arrangement.

1. Arrange the data that you want to chart on a worksheet.
2. Select the cells that contain the data that you want to use for the chart. Ideally, your data and appropriate text labels will be positioned so that labels are above and on the left side of your data without extra columns or rows.
3. On the **Insert** tab, in the **Charts** group, choose one the chart types or click on the **See All Charts** button to scroll through the **Insert Chart** dialog box of chart types.



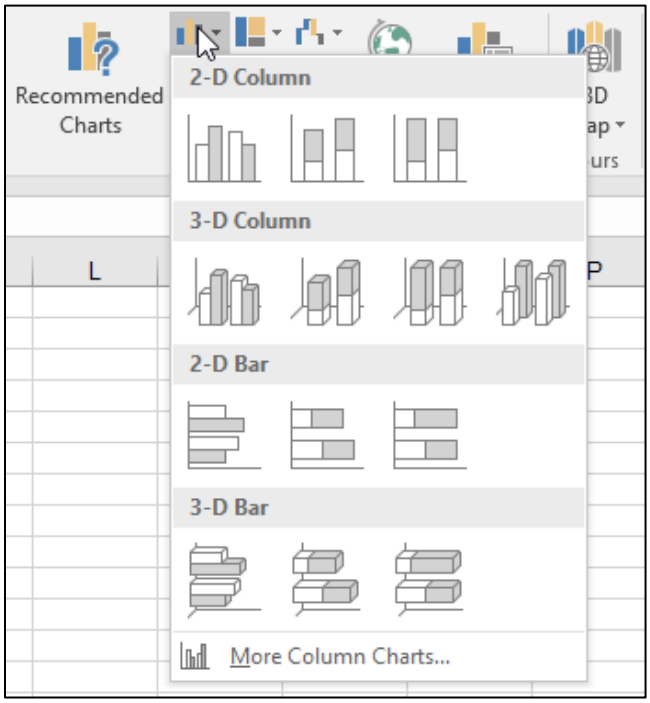
4. Excel will place the chart on the worksheet as an embedded chart by default. You can change this later.
5. Excel will automatically name the chart as Chart1 where one is the number charts created on a worksheet. You can change this later.

Exercise:

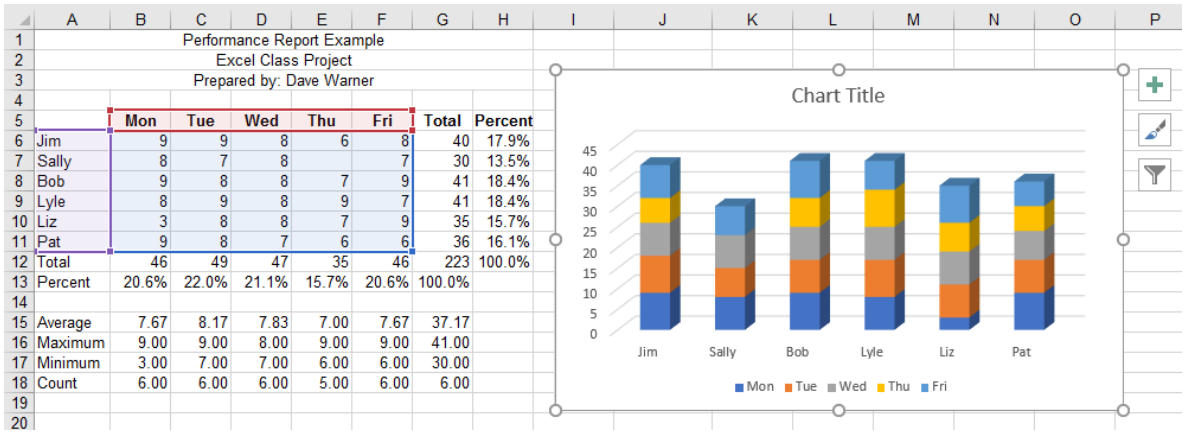
1. Close any workbooks and open **Charting Exercise**.
2. Choose the **Chart 1** tab and look over the data.
3. Select your data including any column and row labels – cells A5:F11.

	A	B	C	D	E	F	G	H
1	Performance Report Example							
2	Excel Class Project							
3	Prepared by: Dave Warner							
4								
5		**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Total**	**Percent**
6	Jim	9	9	8	6	8	40	17.9%
7	Sally	8	7	8		7	30	13.5%
8	Bob	9	8	8	7	9	41	18.4%
9	Lyle	8	9	8	9	7	41	18.4%
10	Liz	3	8	8	7	9	35	15.7%
11	Pat	9	8	7	6	6	36	16.1%
12	Total	46	49	47	35	46	223	100.0%
13	Percent	20.6%	22.0%	21.1%	15.7%	20.6%	100.0%	
14								
15	Average	7.67	8.17	7.83	7.00	7.67	37.17	
16	Maximum	9.00	9.00	8.00	9.00	9.00	41.00	
17	Minimum	3.00	7.00	7.00	6.00	6.00	30.00	
18	Count	6.00	6.00	6.00	5.00	6.00	6.00	

4. On the **Insert** tab, look at the **Charts** group, choose the **Column or Bar Chart** button shown below to see the various options.



Choose **3-D Stacked Column** (2nd choice in 3-D Column. Your chart will appear on the sheet. It can easily be moved or resized as needed.



	Mon	Tue	Wed	Thu	Fri	Total	Percent
Jim	9	9	8	6	8	40	17.9%
Sally	8	7	8		7	30	13.5%
Bob	9	8	8	7	9	41	18.4%
Lyle	8	9	8	9	7	41	18.4%
Liz	3	8	8	7	9	35	15.7%
Pat	9	8	7	6	6	36	16.1%
Total	46	49	47	35	46	223	100.0%
Percent	20.6%	22.0%	21.1%	15.7%	20.6%	100.0%	
Average	7.67	8.17	7.83	7.00	7.67	37.17	
Maximum	9.00	9.00	8.00	9.00	9.00	41.00	
Minimum	3.00	7.00	7.00	6.00	6.00	30.00	
Count	6.00	6.00	6.00	5.00	6.00	6.00	

Note the highlights on your data showing the numbers charted and identifying the labels that are included in the chart display.

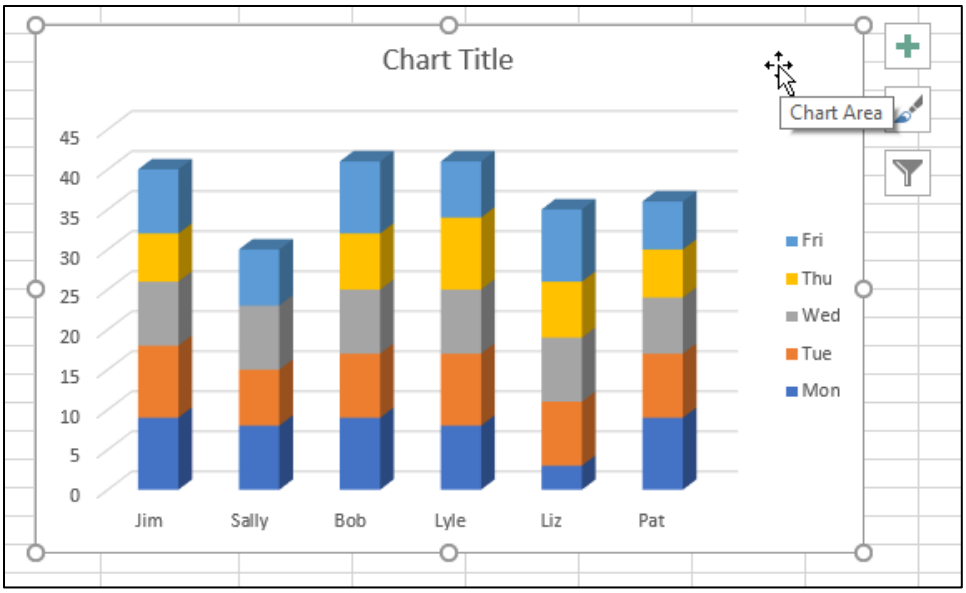
5. Save your work.

6. Moving and resizing your chart is as simple as putting the mouse on the **Chart Area**, which is basically the white areas around your chart elements. The mouse will become a black plus, and a **Tool Tip** will say Chart Area.

   Experiment with moving your chart around on the sheet using the black plus.

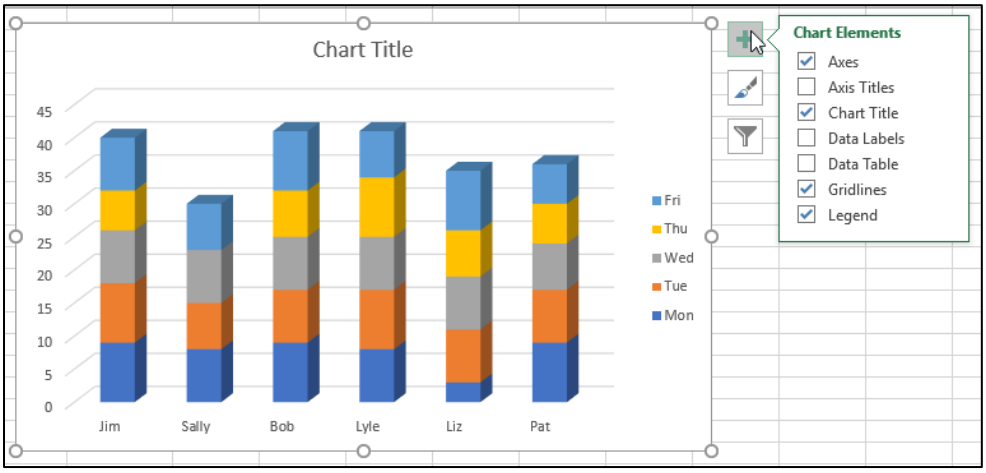
   Note the circles in the corners of the **Chart Area**; they are sizing handles that will allow you to change the size and shape of your chart.

   Experiment with resizing the chart.



7. Adding or removing **Chart Elements** is done with the large plus button just outside the **Chart Area** in the upper-right corner.

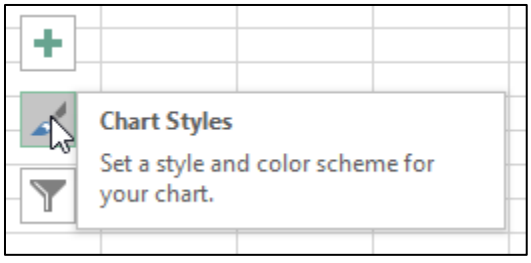
   If You do not see the **Chart Elements** button, it means that your chart is not active (selected) – just click in the Chart Area.



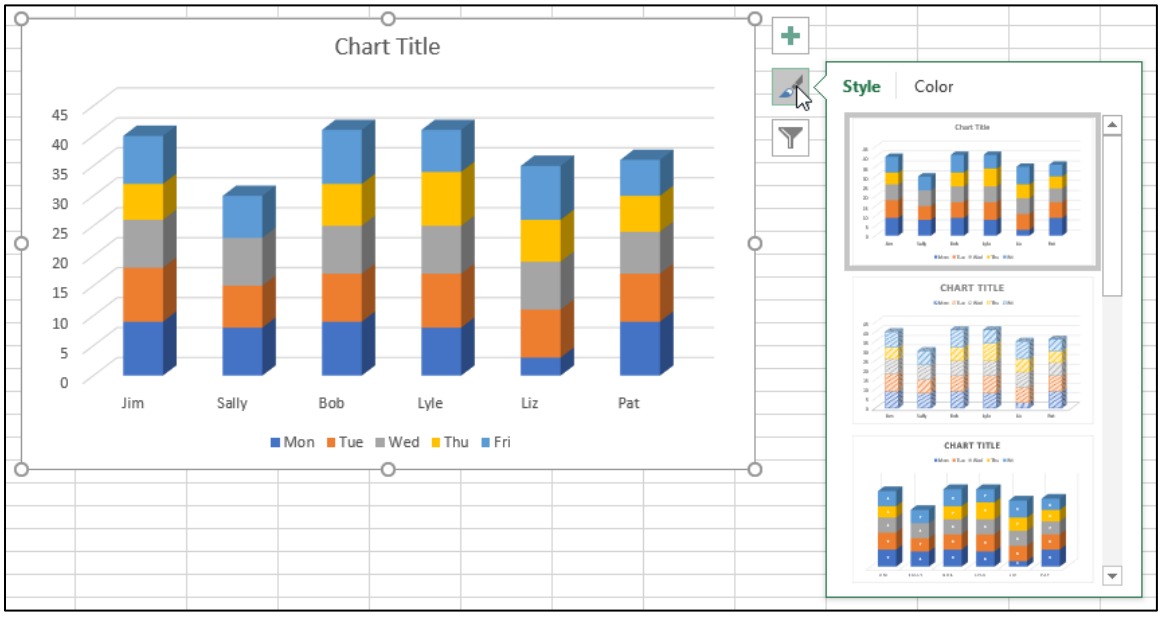
   A check means the element is already in the chart. Take a moment and add/remove elements to see what they are. Do not be surprised if an element, such as the legend, comes back in a different location.

   Each element can be customized, but for now we are just seeing what they are.

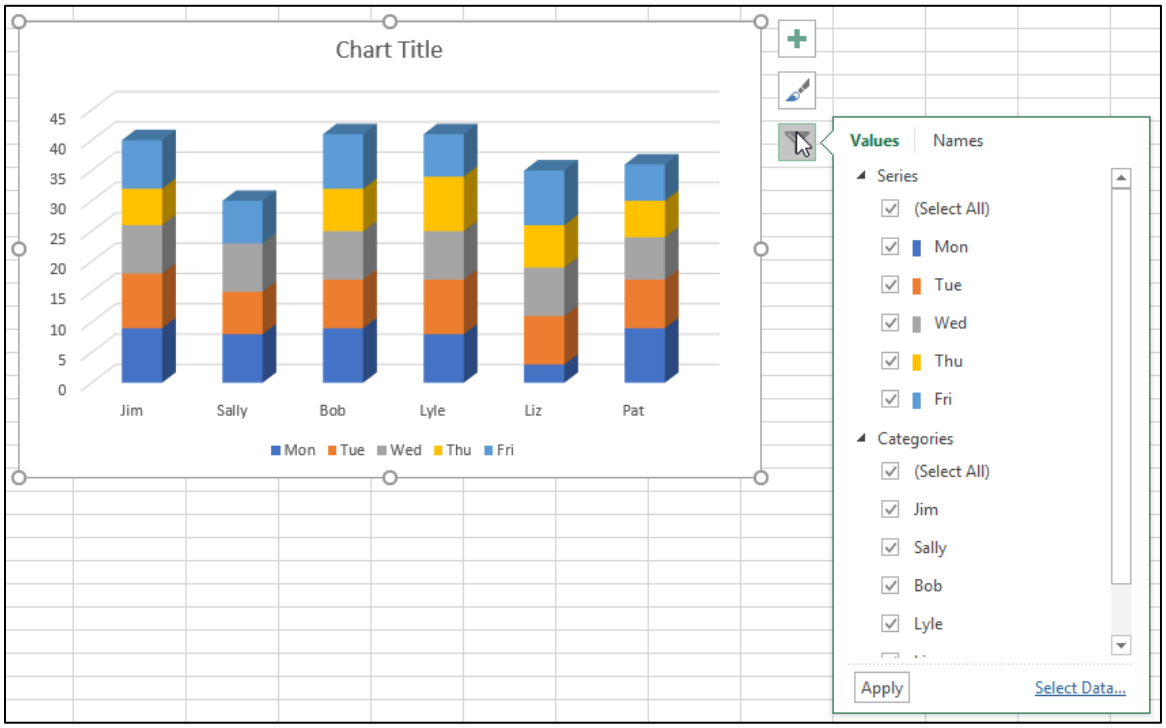
8. The Chart Styles button allows you to quickly change the chart features and textures. Click on it to see the choices.



Scroll through the list and hover your mouse over an option to see it previewed on your chart. You can always bring the box back and change it if you decide to later. The top choice in the list was the original display.



9. Occasionally, after we create our chart, we wish we had slightly different data included. The **Chart Filters** button lets us do just that we can temporarily hide some the data representing some of our columns or rows.



Use the feature to hide one or two days – when you hover the mouse over the day, it highlights that data. After restoring the days, hide Lyle and then restore him.

10. Save your work.

11. Changing individual displayed elements is also quite easy. For example, the default generic chart title needs improving. Select it my clicking on it and then selecting the text in the box.

Type My First Chart but don't press **[Enter]** unless you want a second row in the title. Currently, you are edit in that box. Click on the box edge to format everything in the box using the formatting tools on the ribbon. Change the color, add Bold, and increase the font a size.

Notice that increasing the size will likely reduce the size of other chart elements, but increasing your chart size as we did earlier can compensate for that.

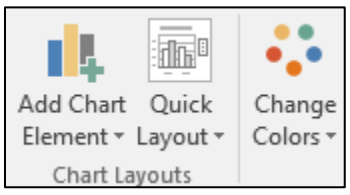
12. Click on the labels at the bottom of the columns will let you format those as well. The same is true for any of the text or numbers on the chart.
13. Save your work and leave it open.

Modify and Format Your Charts

When a chart is selected, the **Design** tab appears offering more tools to modify or format your chart.

Chart elements, Quick Layout, and Change Color theme

The first three offer options that weren't available on the quick tool buttons we used. Each has a drop-down menu to choose from.



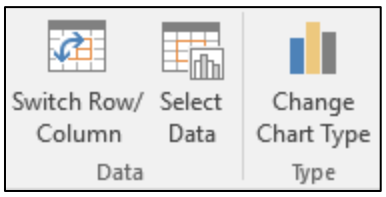
Exercise:

1. Use your workbook and chart from the last exercise.
2. Select the chart so that the **Design** tab appears. Use the drop-down feature on each of the first three buttons. As you look over the choices, if you hover your mouse over the choice, you can see your chart preview what it would look like.

   Note some choices may be muted because they are not appropriate for that chart type.
3. Save your work.

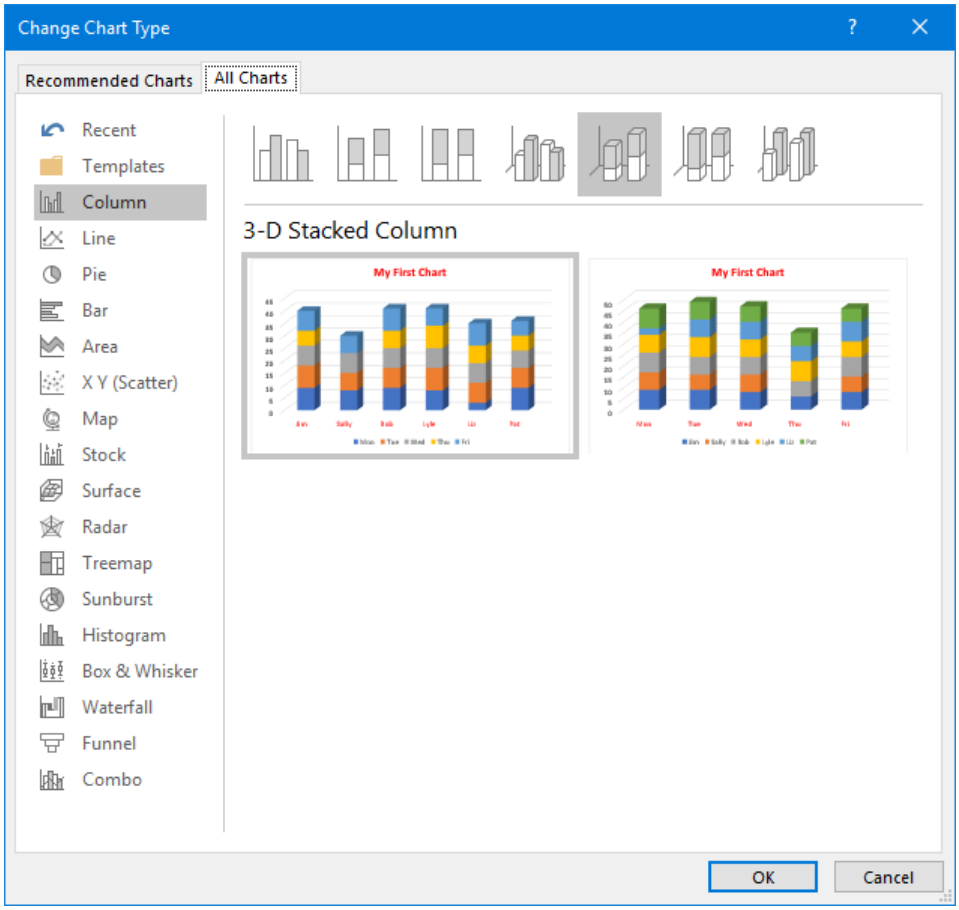
Flip your chart and Change the Chart Type

Near the right-end are two useful options. **Switch the Row/Column** swaps the x and y axis without manually swapping values. Change Chart Type lets you go back to the beginning with your selections and edits to see what other chart types and variations would look like.



Exercise:

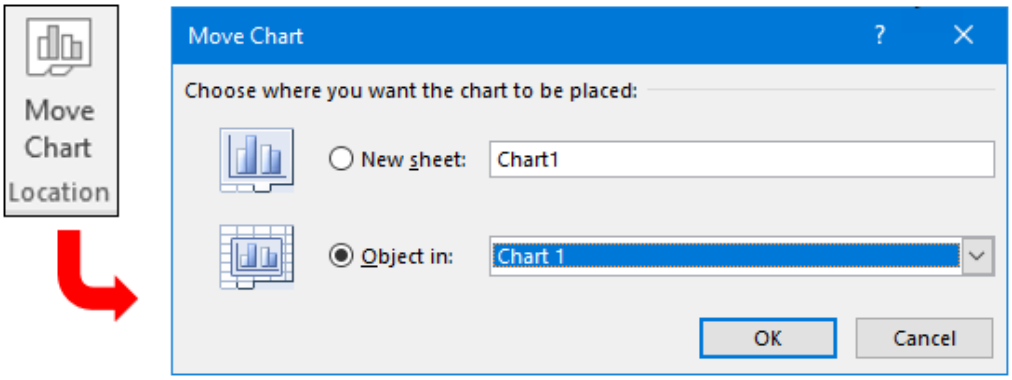
1. Use your workbook and chart from the last exercise.
2. Select the chart so that the **Design** tab appears. Click on the **Switch the Row/Column** button a couple of times and see the orientation change. You can always return. This over-rides Excel's assumption about the best way to display the date in this type of chart.
3. Click on the **Change Chart Type** button. There are two tabs with many chart types and variations. As you pick a **Type** on the left-side of either tab, the upper-right offers variations and the larger pane previews what yours would look like.



4. Experiment and then save your work.

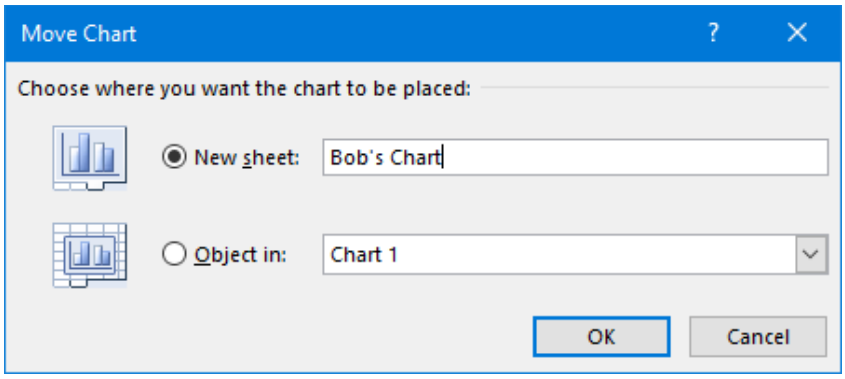
Moving and Renaming your chart

On the **Design** ribbon, the **Move Chart** button brings up the **Move Chart** dialogue box that will allow you to move your chart to a tab of its own and assign it a more descriptive name than the default.



Exercise:

1. Use your workbook and chart from the last exercise.
2. Select the chart so that the **Design** tab appears. Click on the **Move Chart** button to bring up the **Move Chart** dialogue box.



3. Choose the **New sheet:** option and change the name using your name.
4. Look over your new sheet and the fact that the Design ribbon is still available for further customization.
5. Experiment and then save your work.

Creating pie charts

A pie chart is a circle that is divided into slices, and each slice represents a proportion of the whole. It is a representation of your data in one series with labels. Pie charts are only useful if there are a limited number of pie slices.

The only real difference from the example before is in selecting the data. Data can be side-by-side columns or rows of a set of labels and the data, or you need to use the **[Ctrl]** key to select non-contiguous labels and data.

	A	B
23	Jim	40
24	Sally	30
25	Bob	41
26	Lyle	41
27	Liz	35
28	Pat	36

	A	B	C	D	E	F	G	H
5		**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Total**	**Percent**
6	Jim	9	9	8	6	8	40	17.9%
7	Sally	8	7	8		7	30	13.5%
8	Bob	9	8	8	7	9	41	18.4%
9	Lyle	8	9	8	9	7	41	18.4%
10	Liz	3	8	8	7	9	35	15.7%
11	Pat	9	8	7	6	6	36	16.1%
12	Total	46	49	47	35	46	223	100.0%
13	Percent	20.6%	22.0%	21.1%	15.7%	20.6%	100.0%	

Exercise:

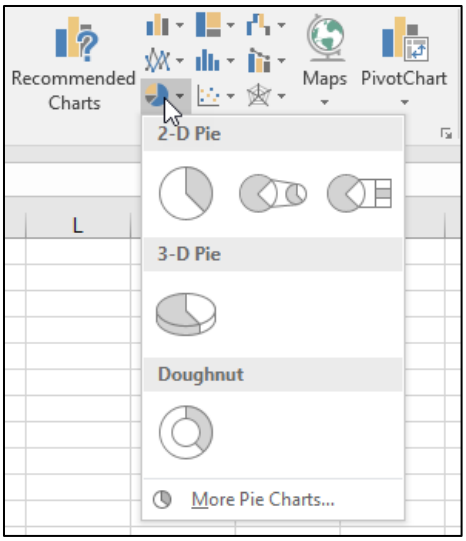
1. Use your workbook and choose the Chart 2 sheet.
2. We can select our data to chart as shown above or using the days of the week.

	A	B	C	D	E	F	G	H
5		**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Total**	**Percent**
6	Jim	9	9	8	6	8	40	17.9%
7	Sally	8	7	8		7	30	13.5%
8	Bob	9	8	8	7	9	41	18.4%
9	Lyle	8	9	8	9	7	41	18.4%
10	Liz	3	8	8	7	9	35	15.7%
11	Pat	9	8	7	6	6	36	16.1%
12	Total	46	49	47	35	46	223	100.0%
13	Percent	20.6%	22.0%	21.1%	15.7%	20.6%	100.0%	

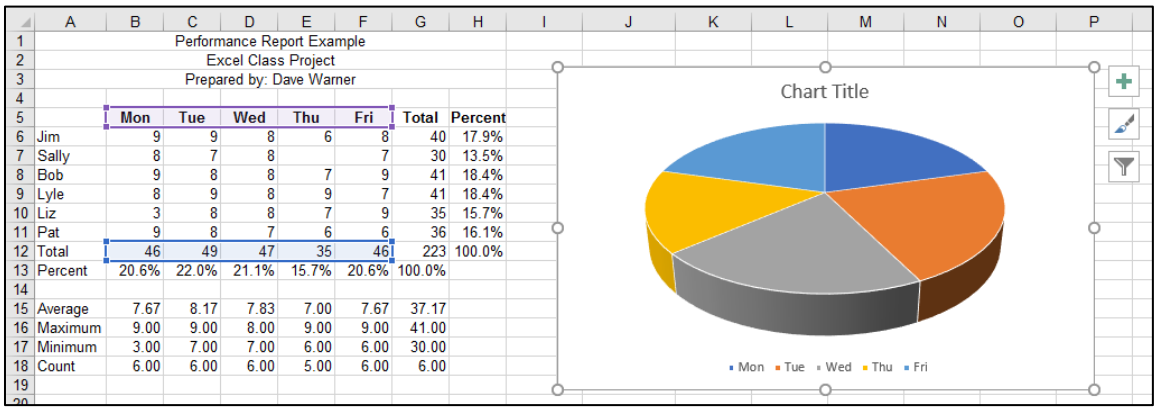
   In either case, we select the labels normally, but then we hold the **[Ctrl]** key as we select the numbers – the totals. If you make a mistake selecting the second range, it is always best to just start over.

   Select either data set.

3. On the **Insert** tab, look at the **Charts** group, choose the **Insert Pie or Donut Chart** button shown below to see the options.



Choose **3-D Pie**. Your chart will appear on the sheet. From here everything is just like before although there are fewer elements and variations on Pie charts.



	A	B	C	D	E	F	G	H
1	Performance Report Example							
2	Excel Class Project							
3	Prepared by: Dave Warner							
4								
5		Mon	Tue	Wed	Thu	Fri	Total	Percent
6	Jim	9	9	8	6	8	40	17.9%
7	Sally	8	7	8		7	30	13.5%
8	Bob	9	8	8	7	9	41	18.4%
9	Lyle	8	9	8	9	7	41	18.4%
10	Liz	3	8	8	7	9	35	15.7%
11	Pat	9	8	7	6	6	36	16.1%
12	Total	46	49	47	35	46	223	100.0%
13	Percent	20.6%	22.0%	21.1%	15.7%	20.6%	100.0%	
14								
15	Average	7.67	8.17	7.83	7.00	7.67	37.17	
16	Maximum	9.00	9.00	8.00	9.00	9.00	41.00	
17	Minimum	3.00	7.00	7.00	6.00	6.00	30.00	
18	Count	6.00	6.00	6.00	5.00	6.00	6.00	
19								

4. Save your work.

PivotTables and PivotCharts

Being able to analyze data quickly can help you make better business decisions. But sometimes it's hard to know where to start, especially when you have a lot of data. PivotTables are a great way to summarize, analyze, explore, and present your data, and you can create them with just a few clicks. PivotTables are highly flexible and can be quickly adjusted depending on how you need to display your results. You can also create PivotCharts based on PivotTables that will automatically update when your PivotTables do.

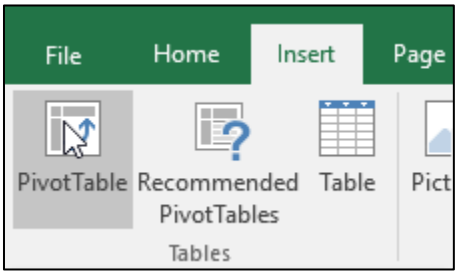
Before you get started

- Your data should be organized in a tabular format, and not have any blank rows or columns.
- Tables are a great PivotTable data source because rows added to a table are automatically included in the PivotTable when you refresh the data, and any new columns will be included in the PivotTable Fields List. Otherwise, you need to either manually update the data source range, or use a dynamic named range formula.
- Data types in each column should be the same – don't mix dates and text in the same column.
- PivotTables work on a snapshot of your data, called the cache, so your actual data doesn't get altered in any way.

Create a PivotTable

A PivotTable is a list analysis tool. They can be very complex but are easy to create. Creating a pivot table does not affect the original data, so feel free to practice without being concerned about affecting the underlying data. To create a pivot table, use the steps below.

1. Click on any single cell within the list.
2. Choose the **Insert** | **Pivot Table** on the ribbon.



3. Drag the appropriate field to the **Column Labels** box.
4. Drag the appropriate field to the **Row Labels** box.

5. Drag the appropriate field to the **Values** box.
6. Drag the appropriate field to the **Report Filter** box.

Deleting a PivotTable

If you create a PivotTable and then decide that you no longer want it, you can simply select the entire PivotTable range, then press Delete. It won't have any effect on other data or PivotTables or charts around it.

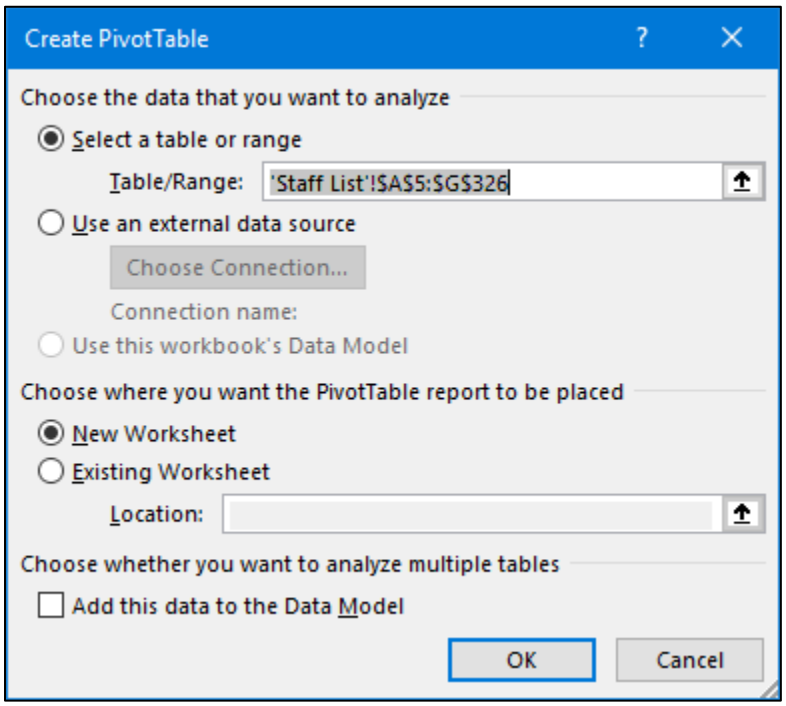
If your PivotTable is on a separate sheet that has no other data you want to keep, deleting that sheet is a fast way to remove the PivotTable.

Analyze Data with a PivotTable

Exercise:

We will start with a very simple example.

1. Close any open workbooks and then open **Staff Database** to the **Staff List** worksheet.
2. Click on A5 (or any single cell in the data) and choose **Insert | PivotTable** on the ribbon. If you have more than one cell selected, Excel will assume you want to work with that data. The following box will appear.

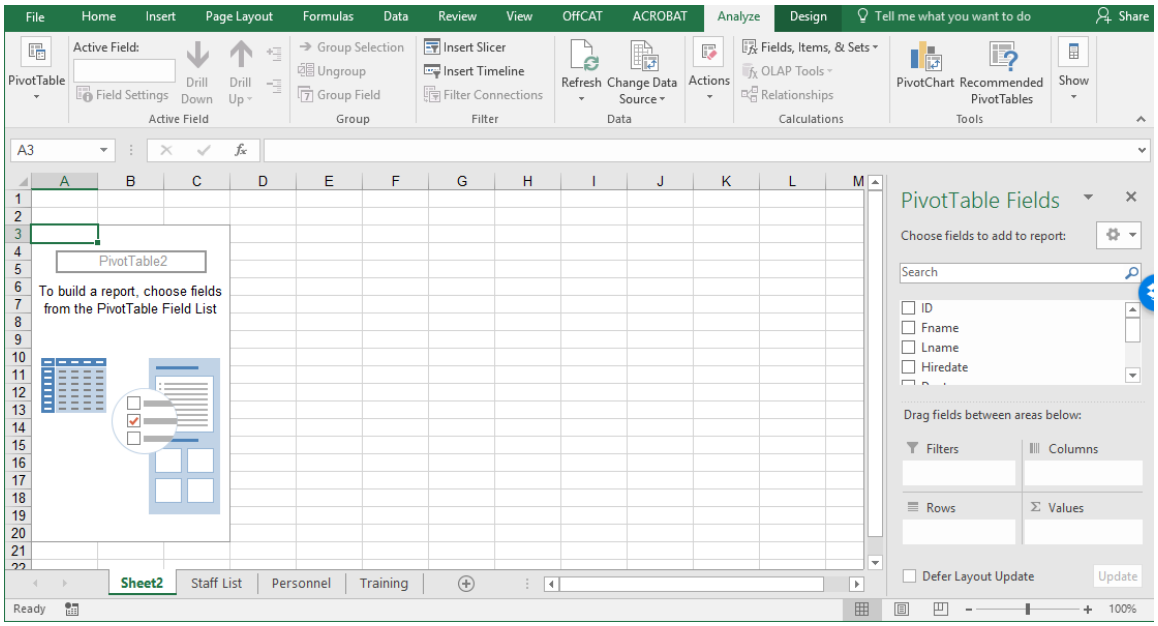


The default is to select all contiguous columns and rows – why you don't want empty columns or rows in your data.

The second set of choices is determining where you want the PivotTable; we will opt to put it on a New Worksheet. Otherwise, it could go to the right of out data.

Click OK.

3. On this window, we will define our PivotTable. We will do it slowly this first time and look at each element as we go.

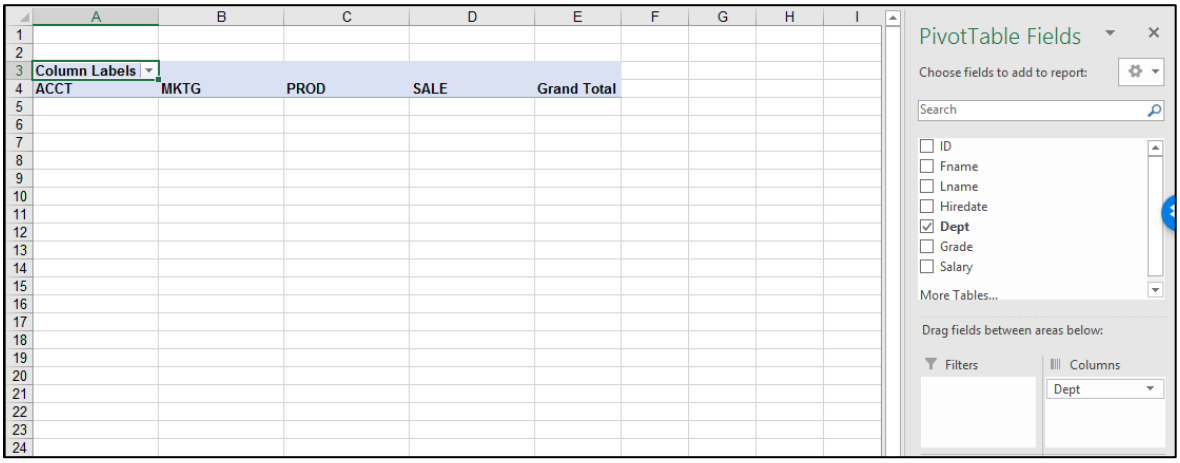


On the right, you see a list of the columns in our table and some boxes below that we will use to define our project. The PivotTable will appear over on the left side where those images appear.

Note: *If you click on the sheet outside the PivotTable, the **PivotTable Fields** tools all disappear – very disconcerting to some. To get them back just click anywhere on the PivotTable – they are only present when the PivotTable is selected.*

4. We are going to pick one or more table columns to be our Columns in this table and another to be the rows – hence the word pivot. In choosing which goes where usually the one with the least variability works best for columns, and the one with more unique values becomes the rows.

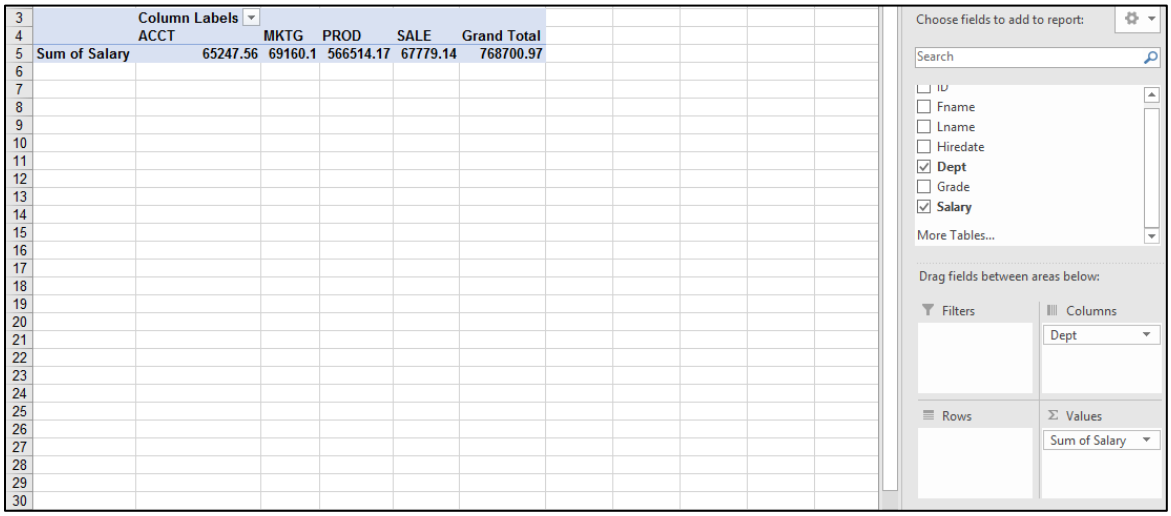
   Let's start by dragging the **Dept** label down and laying it in the **Columns** box. As soon as you do we see the Dept codes appear as column headings on the left.



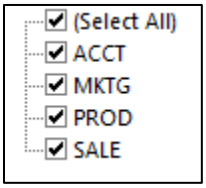
5. Before we worry about rows, let's think about the data we want to be analyzed – the data we want to sum, count, average. In this case, Salary seems like a likely candidate.

6. Drag **Salary** label down to the **Values** box and let's see what happens. In the Values box, Excel assumed we would want to Sum the items because they are a number.

   In the PivotTable, we see totals under each column plus a Grand Total.



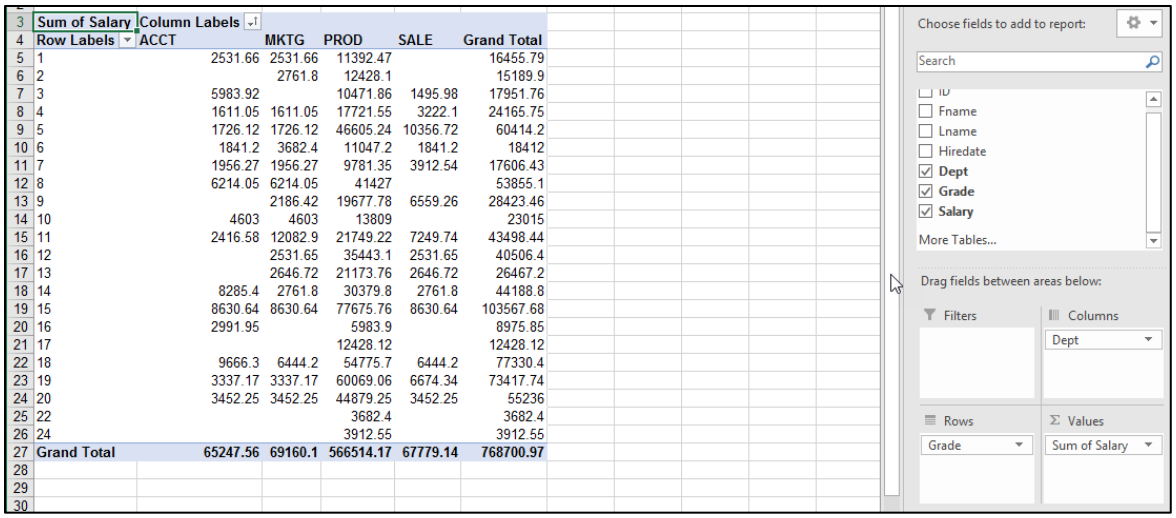
   Note also in cell B3 is a list box labeled **Column Labels**. Click on the drop-down to see what is in it. It is a Filter menu with sort options and a list of departments included in the display.



   Remove the check from PROD and click OK. Notice our table changes immediately – no PROD label or data and the Grand Total adjusted – we can choose which departments to include in our table.

   Use the drop-down again and choose **Clear Filter from "Dept"** to restore all of the columns. Choosing **(Select All)** in the label list would have worked too in this case.

7. Drag the **Grade** label into the **Rows** box. Wow, that made a change.



Sum of Salary	Column Labels				
Row Labels	ACCT	MKTG	PROD	SALE	Grand Total
1	2531.66	2531.66	11392.47		16455.79
2		2761.8	12428.1		15189.9
3	5983.92		10471.86	1495.98	17951.76
4	1611.05	1611.05	17721.55	3222.1	24165.75
5	1726.12	1726.12	46605.24	10356.72	60414.2
6	1841.2	3682.4	11047.2	1841.2	18412
7	1956.27	1956.27	9781.35	3912.54	17606.43
8	6214.05	6214.05	41427		53855.1
9		2186.42	19677.78	6559.26	28423.46
10	4603	4603	13809		23015
11	2416.58	12082.9	21749.22	7249.74	43498.44
12		2531.65	35443.1	2531.65	40506.4
13		2646.72	21173.76	2646.72	26467.2
14	8285.4	2761.8	30379.8	2761.8	44188.8
15	8630.64	8630.64	77675.76	8630.64	103567.68
16	2991.95		5983.9		8975.85
17			12428.12		12428.12
18	9666.3	6444.2	54775.7	6444.2	77330.4
19	3337.17	3337.17	60069.06	6674.34	73417.74
20	3452.25	3452.25	44879.25	3452.25	55236
22			3682.4		3682.4
24			3912.55		3912.55
Grand Total	65247.56	69160.1	566514.17	67779.14	768700.97

We seem to have a breakdown of salaries by grade in each department. We also know now that there are no Grade 21 or 23 employees anywhere in the company.

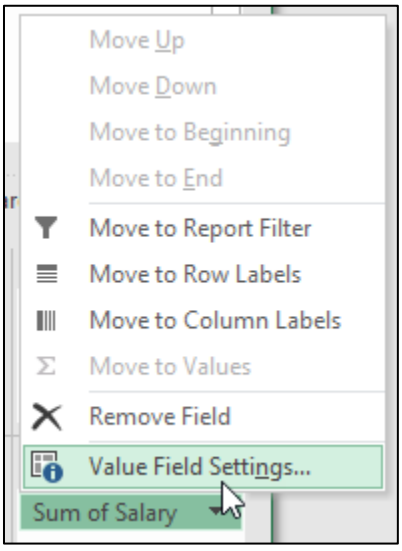
There is a new list box in cell B4 called Row Labels – note the little down triangle on it. Open it, and it looks like the one for columns except now it lists pay grades at the bottom. Notice grades 21 and 23 do not appear there either, further confirming that there are none – not that they are filtered out.

Remove the checks from **Grades 20**, **22** and **24** and click OK. They are gone from the table. Notice the new symbol on drop-down button – the funnel tells us there is a filter in place.

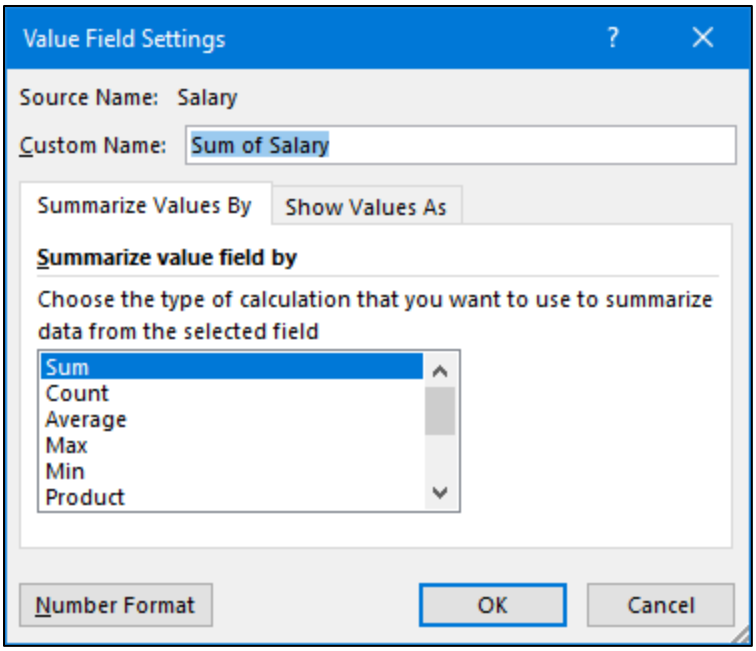
Use the drop-down and choose **(Select All)** and OK. The rows are back, and the funnel is gone from the button.

8. Notice that each of the labels that we dragged down to box has a check in it up in the “Field” list and a drop-down button in the box we put them in. I’m particularly interested in the **Values** box.

   Click on the drop-down button for **Sum of Salary**.



   Look at the options and then click on **Value Field Settings…**

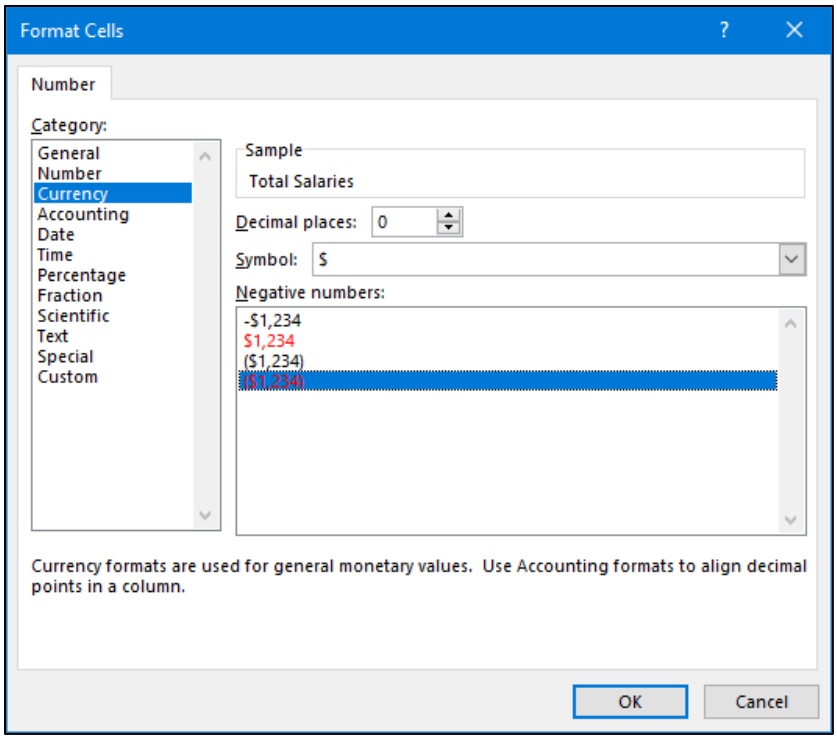


Note we could change the name to something like Total Salaries if we wanted to. Hint: save that for last, once you are sure what you are going to do.

It looks like we could change the calculation from Sum to any one of the other statistical functions. Change it to **Count** and click **OK**. We now have a headcount by grade by the department.

Go back in and change it back to a **SUM** function and change the name to **Total Salaries**.

9. Let's fix the numbers. Click on the drop-down arrow in the **Values** box – now called Total Salaries and choose **Value Field Settings…** again. Notice in the bottom-left, there is a **Number Format** button. Click on it.

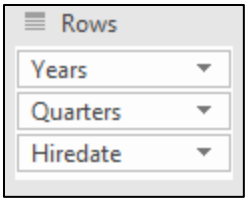


This should look familiar. Make the above choices and click OK (twice). This should look better.

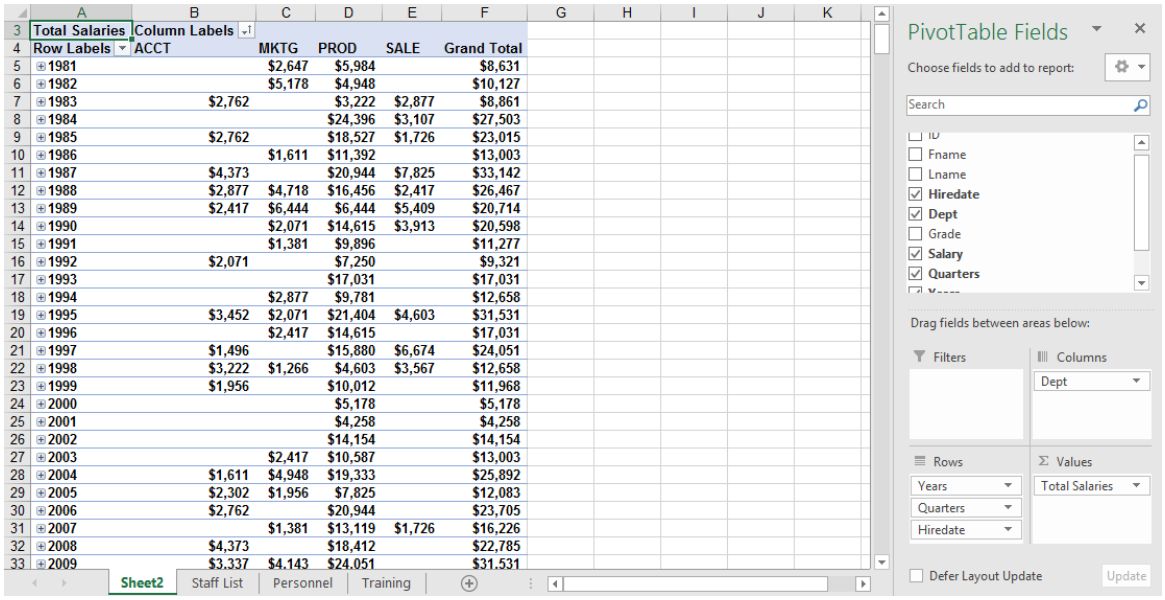
10. Our data didn't offer too many options for comparisons, but there is still one other variation that we could look at.

    In our "Field" list at the top, remove the check from **Grade**, which has the same effect as pulling it out of the **Rows** box.

    Drag **Hiredate** down to the **Rows** box. Notice that Excel added to additional entries, **Years** and **Quarters** allowing us to group by year and by quarter.



    In the table, we have Salaries grouped by hiredate year.



Total Salaries	Column Labels				
Row Labels	ACCT	MKTG	PROD	SALE	Grand Total
⊞1981		$2,647	$5,984		$8,631
⊞1982		$5,178	$4,948		$10,127
⊞1983	$2,762		$3,222	$2,877	$8,861
⊞1984			$24,396	$3,107	$27,503
⊞1985	$2,762		$18,527	$1,726	$23,015
⊞1986		$1,611	$11,392		$13,003
⊞1987	$4,373		$20,944	$7,825	$33,142
⊞1988	$2,877	$4,718	$16,456	$2,417	$26,467
⊞1989	$2,417	$6,444	$6,444	$5,409	$20,714
⊞1990		$2,071	$14,615	$3,913	$20,598
⊞1991		$1,381	$9,896		$11,277
⊞1992	$2,071		$7,250		$9,321
⊞1993			$17,031		$17,031
⊞1994		$2,877	$9,781		$12,658
⊞1995	$3,452	$2,071	$21,404	$4,603	$31,531
⊞1996		$2,417	$14,615		$17,031
⊞1997	$1,496		$15,880	$6,674	$24,051
⊞1998	$3,222	$1,266	$4,603	$3,567	$12,658
⊞1999	$1,956		$10,012		$11,968
⊞2000			$5,178		$5,178
⊞2001			$4,258		$4,258
⊞2002			$14,154		$14,154
⊞2003		$2,417	$10,587		$13,003
⊞2004	$1,611	$4,948	$19,333		$25,892
⊞2005	$2,302	$1,956	$7,825		$12,083
⊞2006	$2,762		$20,944		$23,705
⊞2007		$1,381	$13,119	$1,726	$16,226
⊞2008	$4,373		$18,412		$22,785
⊞2009	$3,337	$4,143	$24,051		$31,531

    A closer look at our row labels shows a plus box meaning it can be expanded to show greater level of detail. Expand **1987** to see our quarterly details.

	A	B	C	D	E	F
10	⊞1986		$1,611	$11,392		$13,003
11	⊟1987					
12	⊞Qtr1	$4,373		$3,222		$7,595
13	⊟Qtr3					
14	Jul			$3,337	$2,417	$5,754
15	Aug			$2,071		$2,071
16	Sep			$3,797		$3,797
17	Qtr3 Total			$9,206	$2,417	$11,623
18	⊞Qtr4			$8,516	$5,409	$13,924
19	1987 Total	$4,373		$20,944	$7,825	$33,142
20	⊞1988	$2,877	$4,718	$16,456	$2,417	$26,467
21	⊞1989	$2,417	$6,444	$6,444	$5,409	$20,714

    Some quarters can be further expanded to give us monthly data. This capability makes more sense with Sales data, but you can see how it works.

    The minus (-) button in front of any expanded item, would close it back down.

11. Name your tab **Salary Pivot**.

12. Experiment and save your work.

Working with More Data

In this exercise, we will look at being able to summarize on multiple columns of data much like what Excel did with the date data. Let's assume that we are trying to get a handle on which health plans our employees have at each location to possibly help us set up benefit meetings and distribute the appropriate materials.

Exercise:

1. Use **Staff Database** and move to the **Personnel** worksheet. Look it over. It is an example of a personnel file.
2. Click anywhere on the table and choose **Insert | PivotTable** on the ribbon.
3. Accept the defaults in the **Create PivotTable** box.
4. Look over our list of data fields – columns in the Personnel table.
5. Drag the **Health Plan** label to the **Columns** box.
6. If we drag Salary to the Values box, it will SUM them requiring us the go in and change it to COUNT. But, I know that all Excel can do with text values is count them, so I could use a label that I know every employee would have data in.

   Drag the **Last Name** label to the **Values** box. Not too bad for a start, although we may want to change the label Count of the Last Name later.

	A	B	C	D	E
1					
2					
3		Column Labels ▼			
4		Blue Cross	Group Health	Health Plus	Grand Total
5	Count of Last Name	168	97	56	321
6					

7. Drag the **Dept** label to the **Rows** box to group our people by the department.

	A	B	C	D	E
3	Count of Last Name	Column Labels ▼			
4	Row Labels ▼	Blue Cross	Group Health	Health Plus	Grand Total
5	ACCT	19	6	3	28
6	ENGR	10	8	2	20
7	MKTG	14	11	5	30
8	PROD	112	62	40	214
9	SALE	13	10	6	29
10	Grand Total	168	97	56	321

8. To add another level of grouping, drag the **Location** label to below **Dept** in the **Rows** box.

	A	B	C	D	E
3	Count of Last Name	Column Labels			
4	Row Labels	Blue Cross	Group Health	Health Plus	Grand Total
5	⊟ACCT				
6	Renton	9	2	1	12
7	Seattle	10	4	2	16
8	ACCT Total	19	6	3	28
9	⊟ENGR				
10	Renton	10	8	2	20
11	ENGR Total	10	8	2	20
12	⊟MKTG				
13	Bellevue	14	11	5	30
14	MKTG Total	14	11	5	30
15	⊟PROD				
16	Renton	42	18	9	69
17	Seattle	70	44	31	145
18	PROD Total	112	62	40	214
19	⊟SALE				
20	Bellevue	13	10	6	29
21	SALE Total	13	10	6	29
22	Grand Total	168	97	56	321

Note we can hide the Location detail for any departments with the (-) buttons.

9. As so often happens, we get to this point, and somebody mentions that we are organizing the meetings and deliveries by location, not by department. This is where PivotTables shine.

   In the **Rows** box, drag **Dept** below **Location** label.

	A	B	C	D	E
3	Count of Last Name	Column Labels			
4	Row Labels	Blue Cross	Group Health	Health Plus	Grand Total
5	⊟Bellevue				
6	MKTG	14	11	5	30
7	SALE	13	10	6	29
8	Bellevue Total	27	21	11	59
9	⊟Renton				
10	ACCT	9	2	1	12
11	ENGR	10	8	2	20
12	PROD	42	18	9	69
13	Renton Total	61	28	12	101
14	⊟Seattle				
15	ACCT	10	4	2	16
16	PROD	70	44	31	145
17	Seattle Total	80	48	33	161
18	Grand Total	168	97	56	321

10. Try adding the Mail Stop (**M/S**) field below **Dept** in the Rows box. You will need to expand the Dept rows to see the result and then it is only dramatic in the production department.

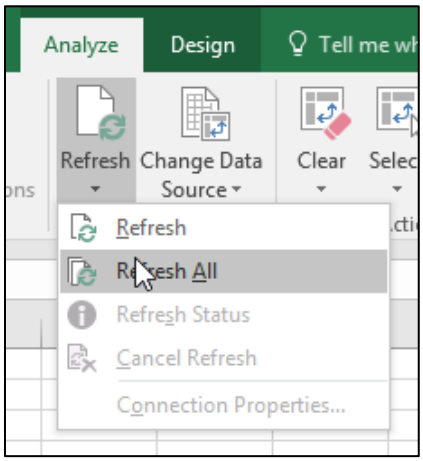
24	⊟ **Seattle**				
25	⊟ **ACCT**				
26	BX-45	10	4	2	16
27	**ACCT Total**	**10**	**4**	**2**	**16**
28	⊟ **PROD**				
29	QR-06	6	6	5	17
30	QR-07	8	9	3	20
31	QR-10	10	4	4	18
32	QR-12	12	3	3	18
33	QR-19	8	7	3	18
34	QR-27	8	5	5	18
35	QR-31	10	4	4	18
36	QR-35	8	6	4	18
37	**PROD Total**	**70**	**44**	**31**	**145**
38	**Seattle Total**	**80**	**48**	**33**	**161**

11. If the label in A1 bothers you go into the Values entry and change to Employees or something.
12. Name the sheet **Health Plans**.
13. Experiment and save your work.

Refreshing Your PivotTable

PivotTables **do not** automatically refresh when the source data changes.

To manually refresh the data, choose to **Analyze | Data | Refresh |Refresh All** on the ribbon. Note the Analyze tab will only be present when the PivotTable is selected – the pointer is anywhere in the table.



To set the pivot table to refresh automatically when the workbook is opened, follow the steps below.

1. Click in the pivot table.
2. On the **Analyze | PivotTable | Options Data** ribbon, or

   Right-click on the PivotTable choose **Pivot Table Options… | Data**
3. Check **Refresh data when opening file**.

4. Click OK.

Note: This will cause the pivot table to refresh when the book is first opened, but not continuously while the book is open, you still must refresh it manually each time the underlying data is changed.

Exercise:

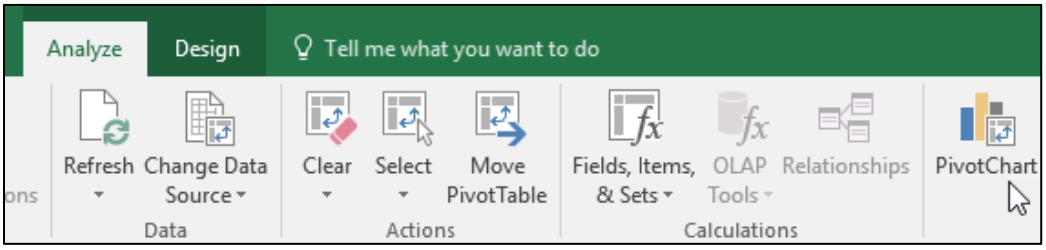
1. Use **Staff Database** and **Personnel** from the last exercise.
2. Click on your PivotTable tab and note the total number of Group Health clients is 97.
3. Return to Personnel and note the first employee is a Group Health employee (cell T2). AutoFill that cell down 15 rows – yes, I hope it isn't done like that in real life either.
4. Return to your PivotTable and not the total is still 97.
5. Choose **Analyze | Data | Refresh | Refresh All** on the ribbon and see your total update.
6. Pressing **Undo** twice will reverse what we just did.

The point is to remember that if your data changes and you want the Pivot to update, refresh it. Remember that PivotTables work on a cached copy of your data, not the live data.

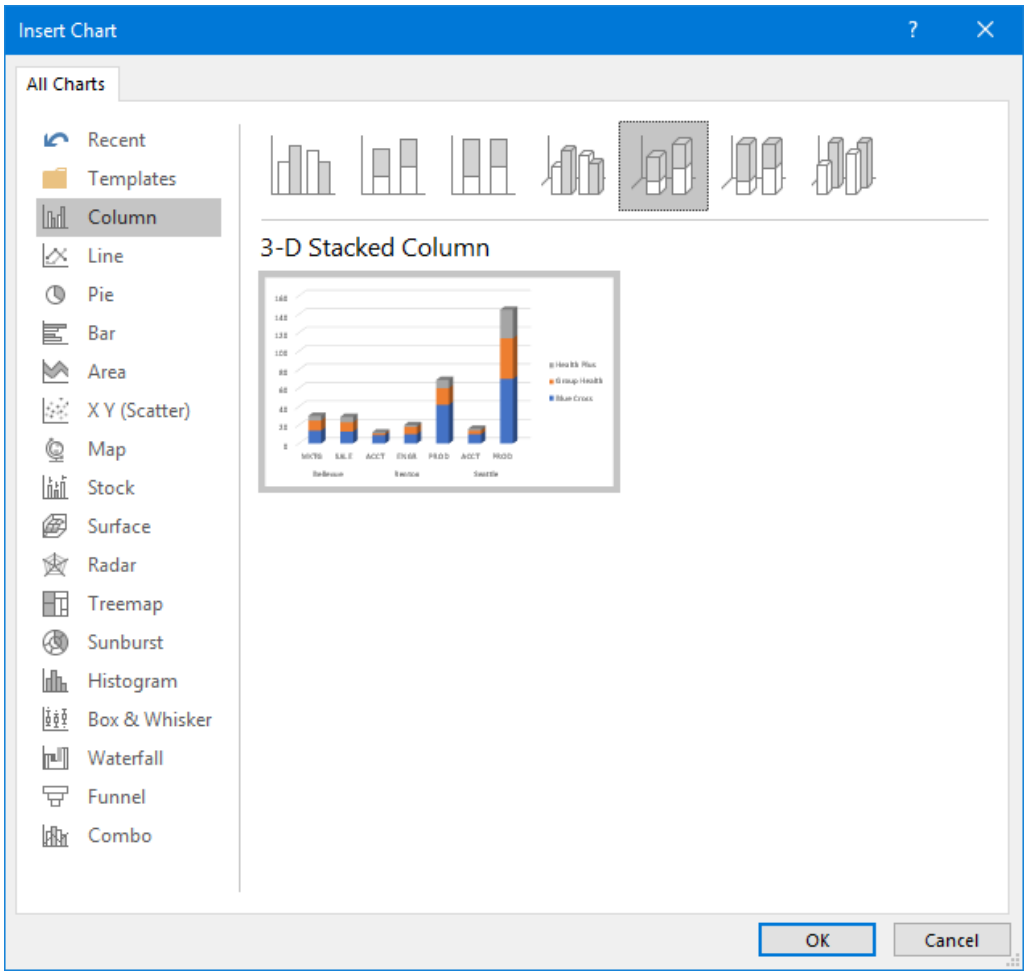
PivotCharts for an Existing PivotTable

Follow these steps, which are really not too different than other Excel Charts.

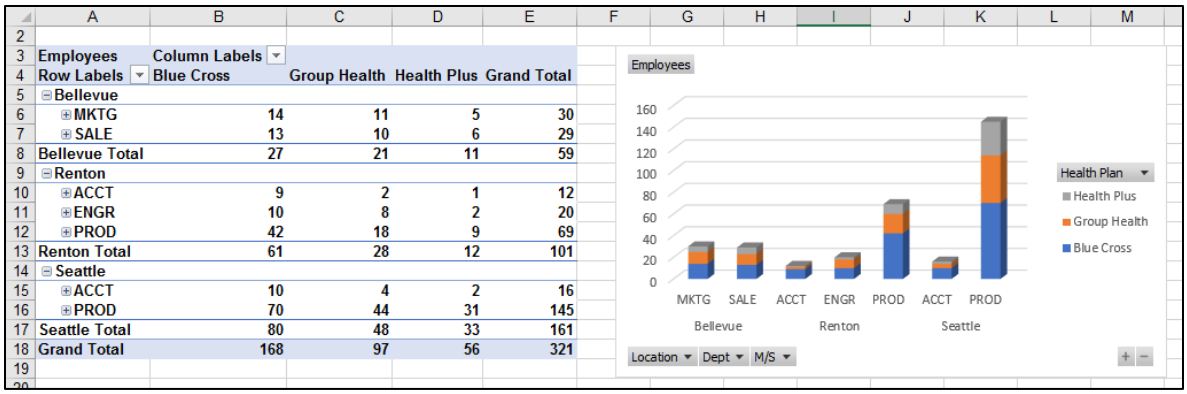
1. Click anywhere in the PivotTable to show the PivotTable Tools (Analyze and Design tabs) on the ribbon.
2. Then choose **Analyze | PivotChart** on the ribbon.



3. In the **Insert Chart** box, click the chart type and chart subtype you want. You can use any chart type except an XY (scatter), bubble, or stock chart.

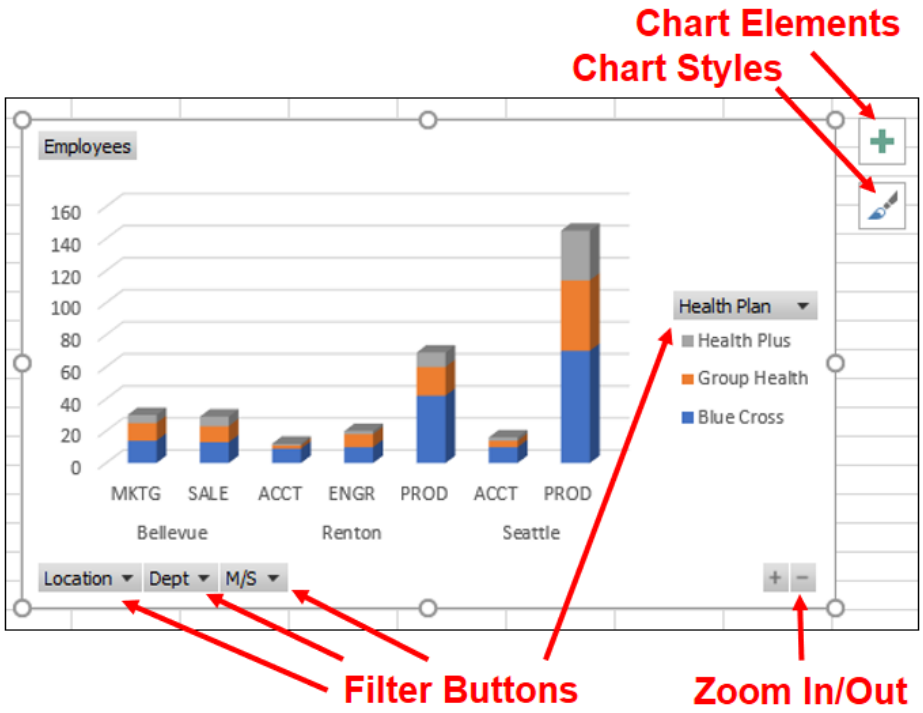


Click OK.



Employees	Column Labels			
Row Labels	Blue Cross	Group Health	Health Plus	Grand Total
Bellevue				
MKTG	14	11	5	30
SALE	13	10	6	29
Bellevue Total	27	21	11	59
Renton				
ACCT	9	2	1	12
ENGR	10	8	2	20
PROD	42	18	9	69
Renton Total	61	28	12	101
Seattle				
ACCT	10	4	2	16
PROD	70	44	31	145
Seattle Total	80	48	33	161
Grand Total	168	97	56	321

4. In the PivotChart, click on any of the Filter buttons with field names, and then pick the sort or filtering options you want.



5. To zoom in or out on the PivotChart, click the plus or minus icons – think of the levels in your PivotTable Rows box.
6. The **Chart Elements** allows you to add or change chart features.
7. The **Chart Styles** allows you to customize this chart style.

Basic Chart elements

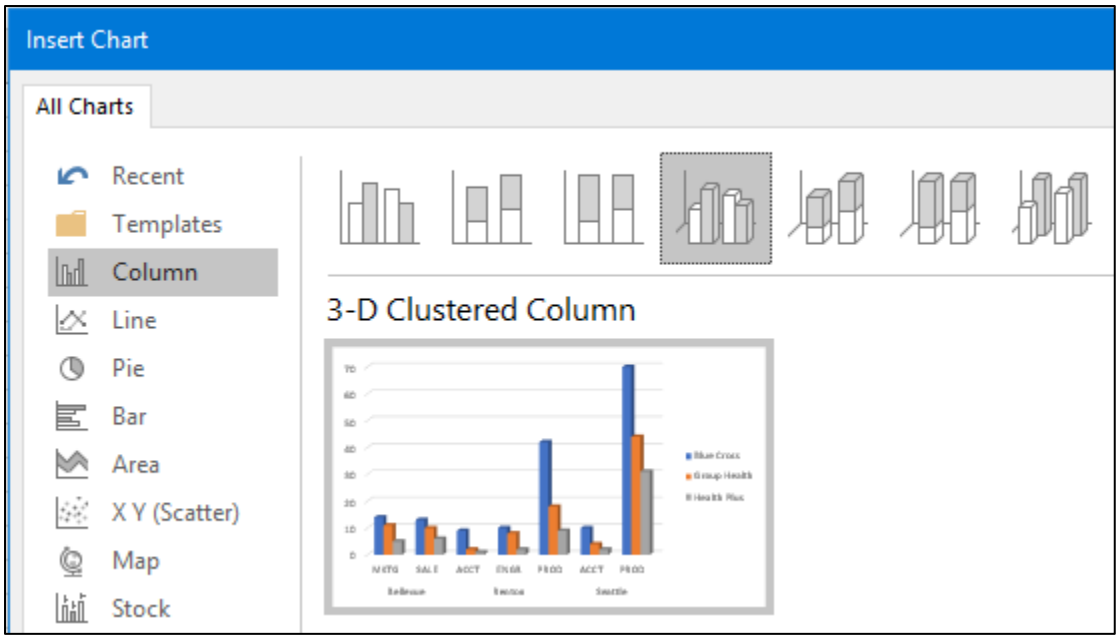
A chart has many elements. Many are displayed by default; others can be added as needed. You can change the display of the chart elements by moving them to other locations in the chart, resizing them, or by changing the format. You can also remove chart elements that you do not want to display.

A chart and its elements

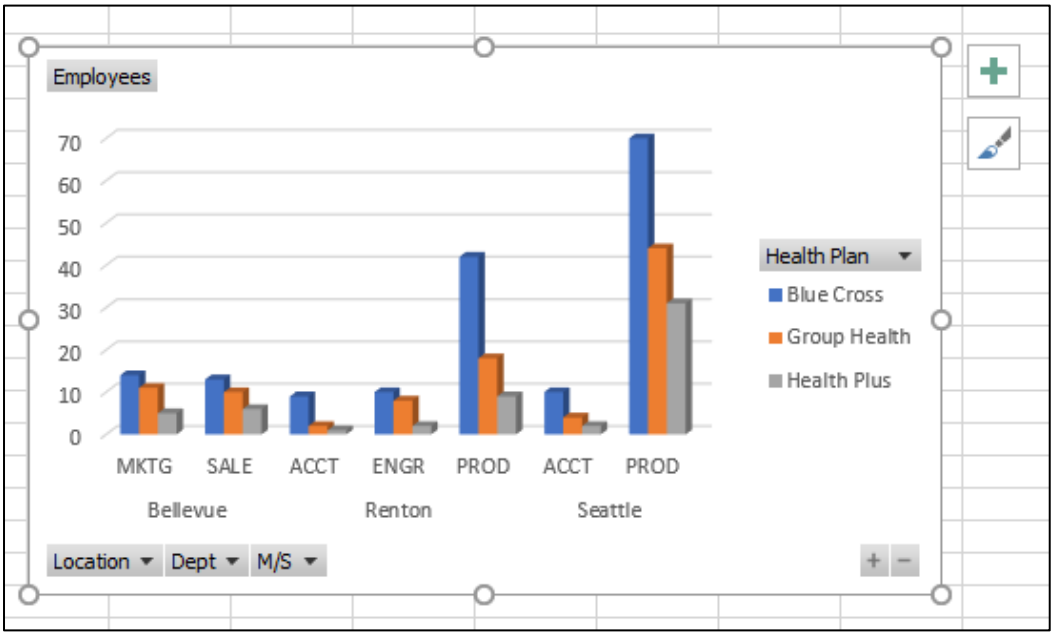
1. Chart area of the chart.
2. Plot area of the chart.
3. Data points of the data series that are plotted in the chart.
4. Horizontal (category) and the vertical (value) axis along which the data is plotted.
5. The legend of the chart.
6. Chart and axis title.
7. Data label that you can use to identify the details of a data point in a data series.

Exercise:

1. Use **Staff Database** and your PivotTable tab from the last exercise.
2. Click anywhere in the PivotTable then choose **Analyze | PivotChart** on the ribbon.
3. In the **Insert Chart** box, click on each of the chart types in the left-side panel to see what your data might look like. Many of the chart types have variations across the top of the right pane. Clicking on each will give you more choices. You can use any chart type except an XY (scatter), bubble, or stock chart.
4. Make the following choice and click OK.



5. Your chart can be moved and resized much like we did with the Watch Window. Move it somewhere to the right or below the PivotTable.

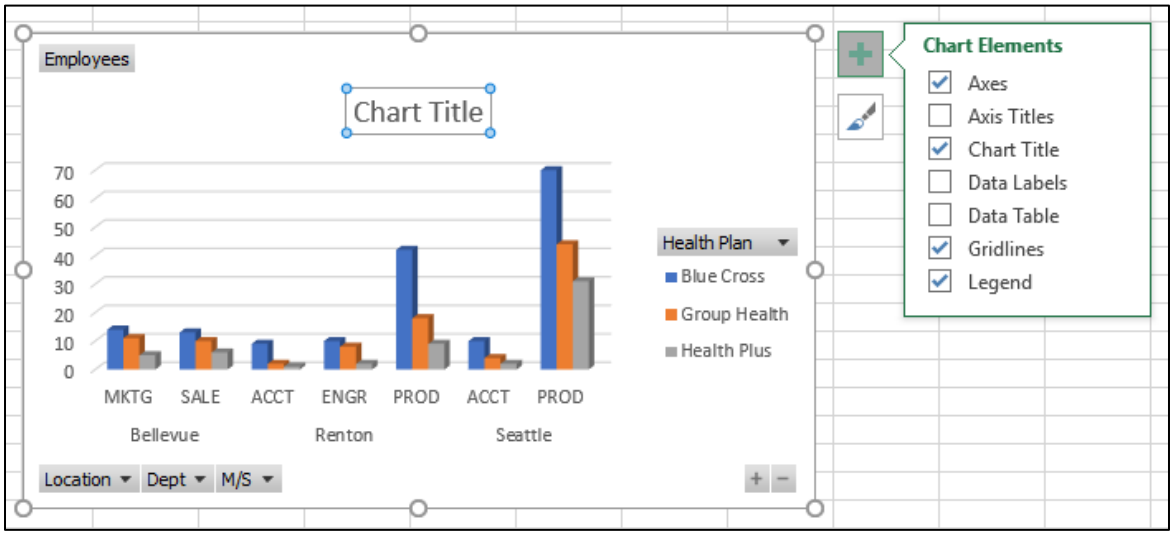


6. Click on the +/- buttons in the lower-right corner and see that you can cycle through the three levels we defined in our Rows window with Location only being the simplest and all three groupings being the busiest.
7. Look at the four Filter buttons: Location, Dept, M/S, and Health Plans. Each allows you to filter out some of the info.

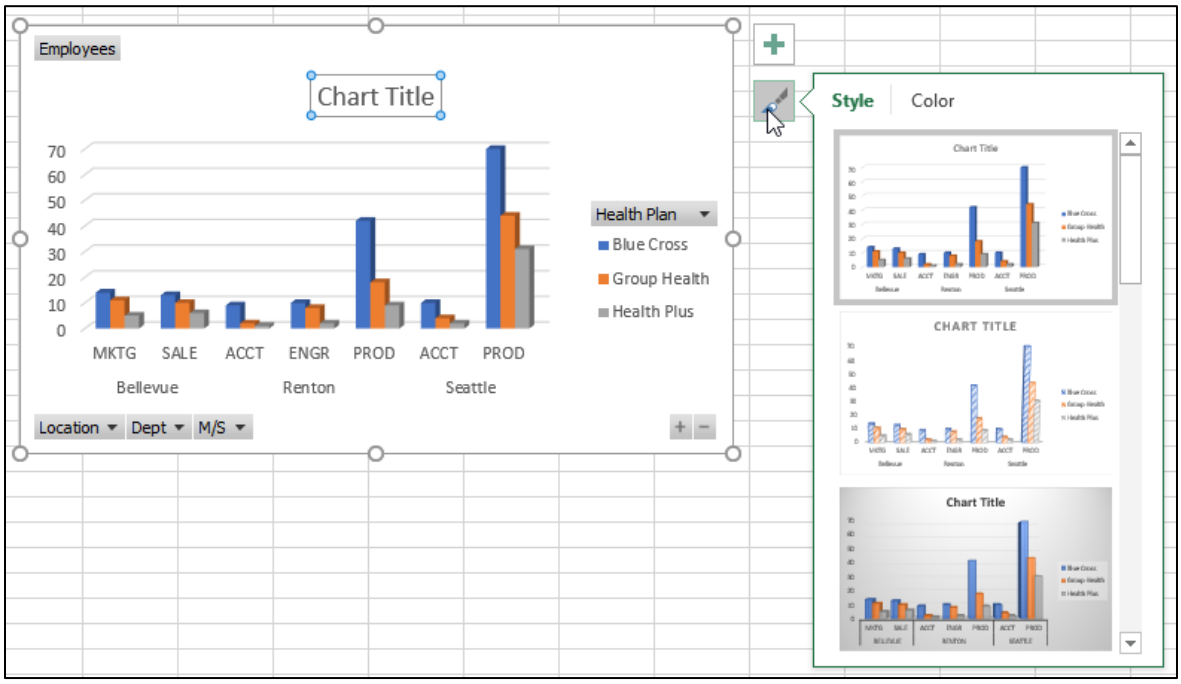
   In **Dept**, remove the check from **PROD** and see how that impacts our chart. Be sure to clear the filter.

   Experiment as you like.
8. The Chart Elements button in the upper-right corner will let you add or remove basic chart components, like a chart title.

Just placing your mouse over an item not selected, will let you preview it on your chart. If you add something, you can always remove it by unchecking it.



9. **Chart Styles**, below Chart Elements, allows you to customize this chart style. Look through the options.



Scroll through the list and hover your mouse over an option to see it previewed on your chart. You can always bring the box back and change it if you decide to later. The top choice in the list was the original display.

10. Changing individual displayed elements is also quite easy. For example, the default generic chart title that I added needs improving. Select it my clicking on it and then selecting the text in the box.

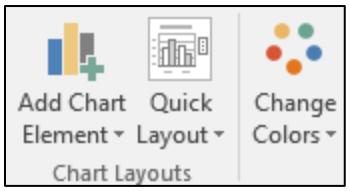
11. Type **Insurance Plans** but don't press **[Enter]** unless you want a second row in the title. Currently, you are edit in that box. Click on the box edge to format everything in the box using the formatting tools on the Home ribbon. Change the color, add Bold, and increase the font a size.
12. Notice that increasing the size will likely reduce the size of other chart elements, but increasing your chart size as we did earlier can compensate for that.
13. Click on the labels at the bottom of the columns will let you format those as well. The same is true for any of the text or numbers on the chart.
14. Save your work and leave it open.

Modify and Format Your Charts

When a chart is selected, the **Design** tab appears offering more tools to modify or format your chart.

Chart elements, Quick Layout, and Change Color Theme

The first three offer options that weren't available on the quick tool buttons we used. Each has a drop-down menu to choose from.



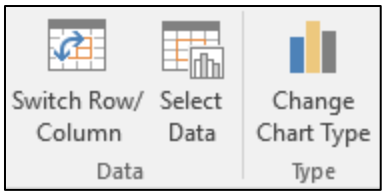
Exercise:

1. Use your workbook and chart from the last exercise.
2. Select the chart so that the **Design** tab appears. Use the drop-down feature on each of the first three buttons. As you look over the choices, if you hover your mouse over the choice, you can see your chart preview what it would look like.

   Note some choices may be muted because they are not appropriate for that chart type.
3. Save your work.

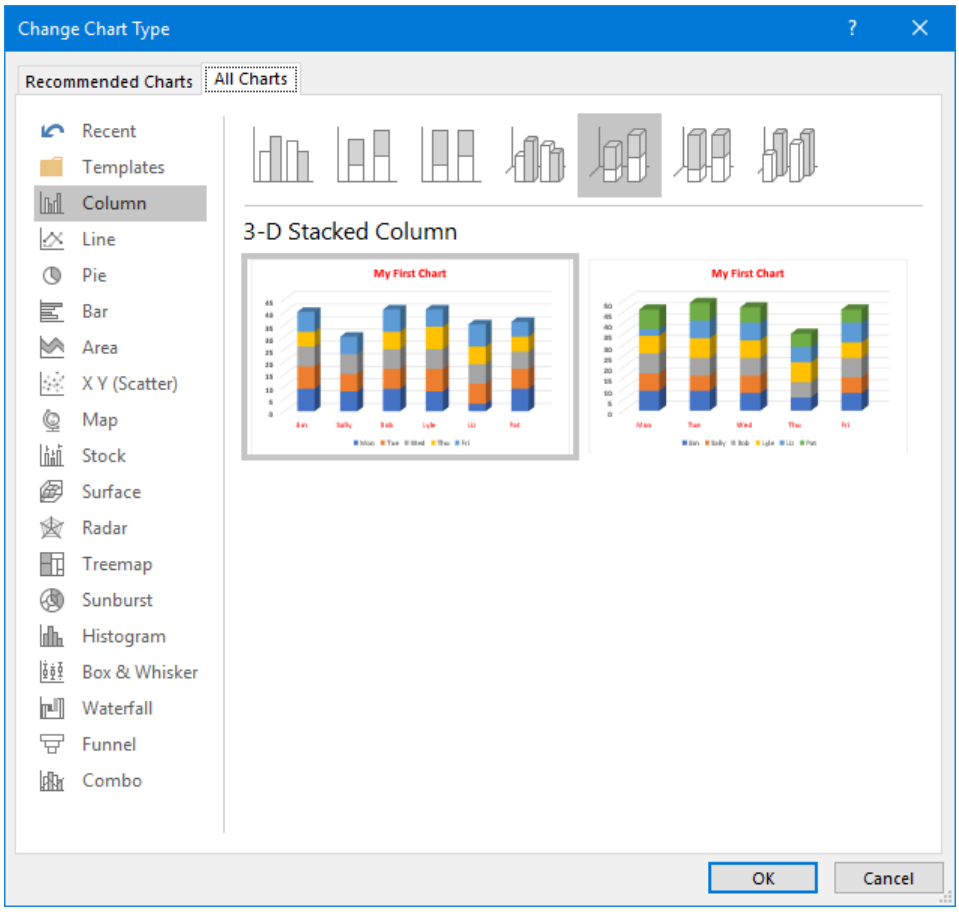
Flip your chart and Change the Chart Type

Near the right end are two useful options. **Switch the Row/Column** swaps the x and y-axis without manually swapping values. Change Chart Type lets you go back to the beginning with your selections and edits to see what other chart types and variations would look like.



Exercise:

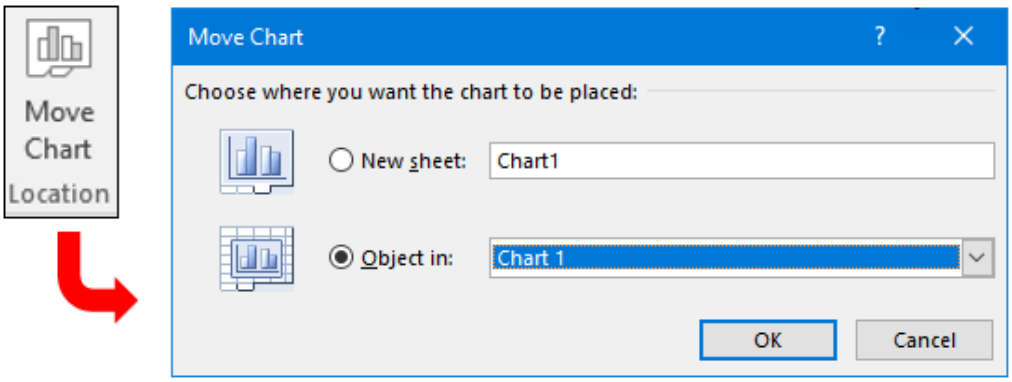
1. Use your workbook and chart from the last exercise.
2. Select the chart so that the **Design** tab appears. Click on the **Switch the Row/Column** button a couple of times and see the orientation change. You can always return. This over-rides Excel's assumption about the best way to display the date in this type of chart.
3. Click on the **Change Chart Type** button. There are two tabs with many chart types and variations. As you pick a **Type** on the left-side of either tab, the upper-right offers variations and the larger pane previews what yours would look like.



4. Experiment and then save your work.

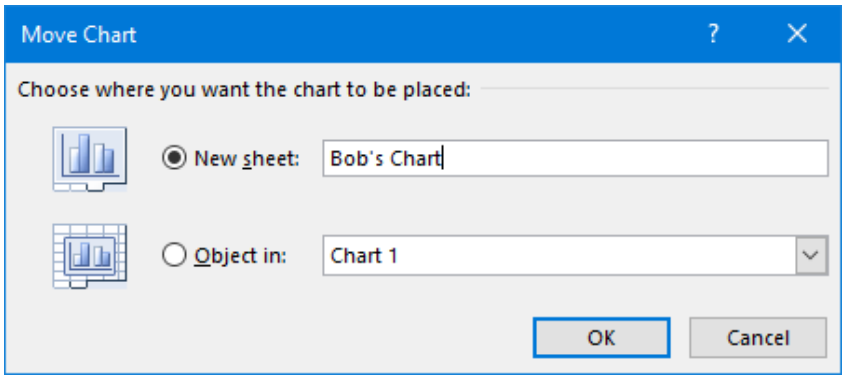
Moving and Renaming your chart

On the **Design** ribbon, the **Move Chart** button brings up the **Move Chart** dialogue box that will allow you to move your chart to a tab of its own and assign it a more descriptive name than the default.



Exercise:

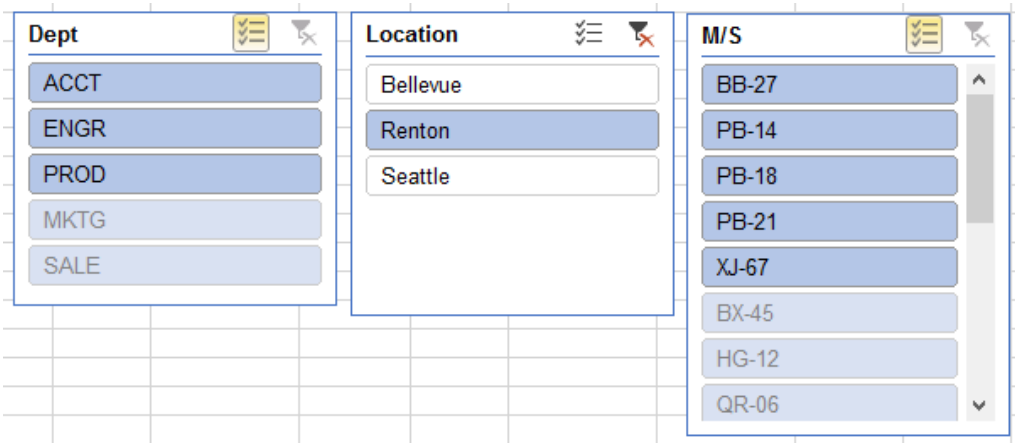
1. Use your workbook and chart from the last exercise.
2. Select the chart so that the **Design** tab appears. Click on the **Move Chart** button to bring up the **Move Chart** dialogue box.



3. Choose the **New sheet:** option and change the name using your name.
4. Look over your new sheet and the fact that the Design ribbon is still available for further customization.
5. Experiment and then save your work.

Slicers Filter Your PivotTable Data

In early versions of Excel, we used report filters to filter data in a PivotTable, but it is not easy to see the current filtering state when you filter on multiple items. Beginning with Excel 2010, you have the option to use slicers to filter the data. Slicers provide buttons that you can click to filter PivotTable data. In addition to quick filtering, slicers also indicate the current filtering state, which makes it easy to understand what exactly is shown in a filtered PivotTable report.

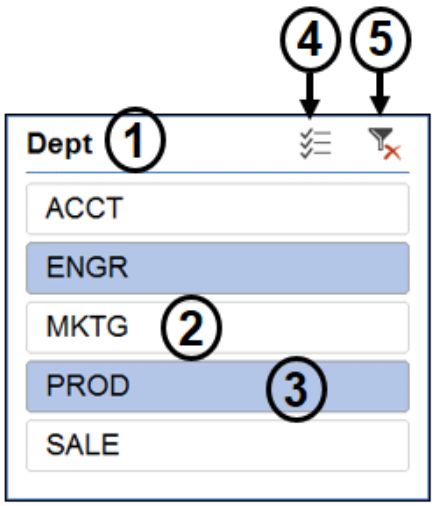


When you select an item, that item is included in the filter, and the data for that item will be displayed in the report.

What are slicers?

Slicers are easy-to-use filtering components that contain a set of buttons that enable you to quickly filter the data in a PivotTable report, without the need to open drop-down lists to find the items that you want to filter.

A slicer typically displays the following elements:



1. **Slicer header** indicates the type of the items in the slicer.

2. Filtering button **not selected** means that item is not included in the filter.

3. Filtering button **selected** means that item is included in the filter.

4. **Multi-select toggle** allows multiple choices without [Ctrl] key.

5. A **Clear Filter** button removes the filter by selecting all items in the slicer.

Slicers can be resized, moved, and will have scrollbars when there are more items than currently visible in the slicer.

Using slicers

To create slicers to filter your PivotTable data, you can:

- Create a slicer associated with the PivotTable.
- Create a copy of a slicer associated with the PivotTable.
- Use an existing slicer associated with another PivotTable.

Because each slicer is designed to filter a specific PivotTable field, you will probably create more than one slicer per PivotTable.

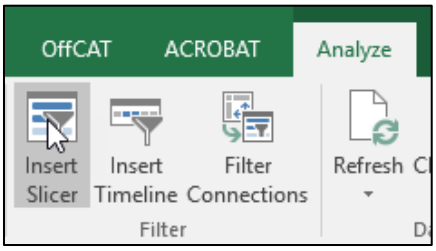
Once created, a slicer appears on the worksheet with the PivotTable. The slicer can be moved and resized as needed.

To filter the PivotTable data, you simply click one or more of the buttons in the slicer.

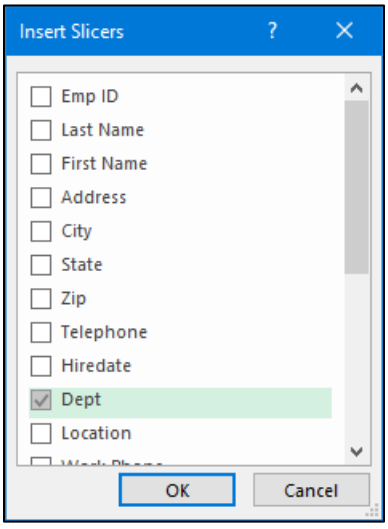
Create a slicer in a PivotTable

Follow these simple steps:

1. Click anywhere in the PivotTable to add the Analyze and Design tab to the ribbon.
2. Choose **Analyze | Insert Slicer**.



3. In the Insert Slicers dialog box, check the PivotTable fields you want to use.



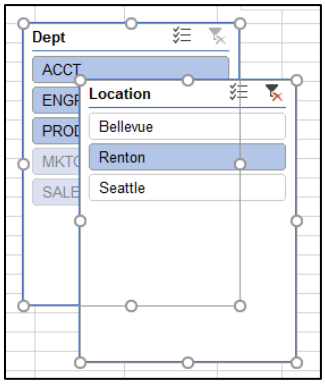
4. Click OK.

A slicer will be created for every field that you selected. They can be moved and resized as needed. If you size it too small to show all options, a scrollbar will appear.

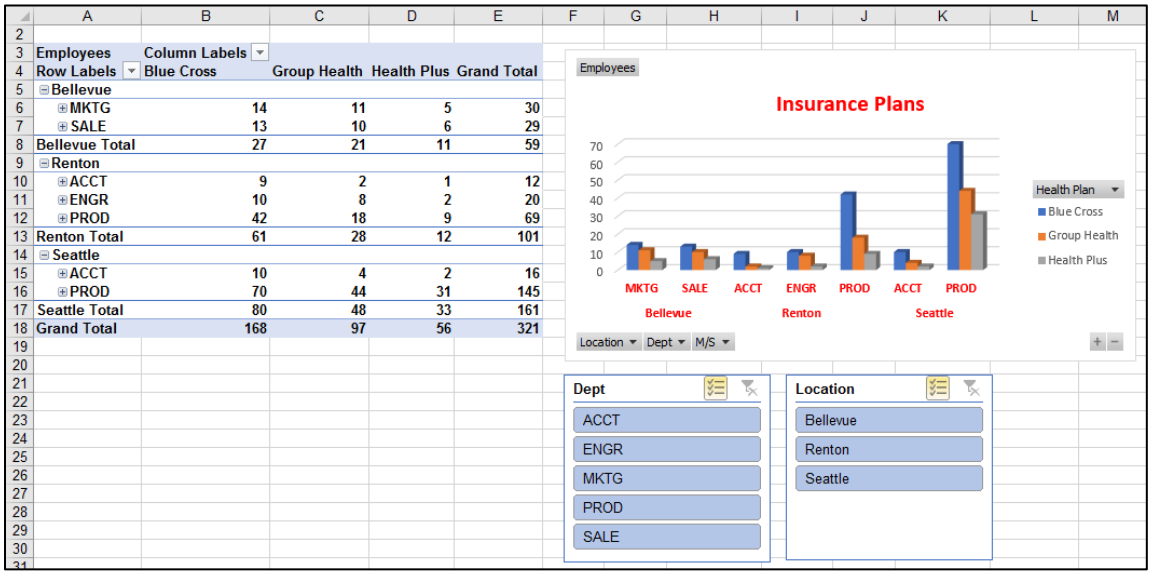
To use a slicer, just click on the items you want to included. To choose more than one item, use **[Ctrl]** key or the multi-select button in the upper-right corner.

Exercise:

1. Use **Staff Database** and your PivotTable tab from the last exercise.
2. Click anywhere in the PivotTable then choose Analyze | PivotChart on the ribbon.
3. Choose **Analyze | Insert Slicer**.
4. In the **Insert Slicers** dialog box, check the **Dept** and **Location** fields and click OK. Your slicers will appear something like this.



5. They can be moved and resized as needed. If you size it too small to show all options, a scrollbar will appear. Move them anywhere that you like – they can always be moved later.



Employees	Column Labels			
Row Labels	Blue Cross	Group Health	Health Plus	Grand Total
Bellevue				
MKTG	14	11	5	30
SALE	13	10	6	29
Bellevue Total	27	21	11	59
Renton				
ACCT	9	2	1	12
ENGR	10	8	2	20
PROD	42	18	9	69
Renton Total	61	28	12	101
Seattle				
ACCT	10	4	2	16
PROD	70	44	31	145
Seattle Total	80	48	33	161
Grand Total	168	97	56	321

6. To use a slicer, just click on the items you want to included. To choose more than one item, use **[Ctrl]** key or the multi-select button in the upper-right corner.

   Remember that the slicers work together, so it is possible to end up with nothing in your table or chart.

7. Experiment and save your work.