

# Excel 2016

## Charts and Graphs



# Excel 2016: Charts and Graphs

2.0 hours

This workshop assumes prior experience with Excel, Basics I recommended. Topics include data groupings; creating and modifying charts; chart types; source data; chart options; chart locations; formatting; adding trend lines and error bars.

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## Charts

A chart helps you display your data into a graphical representation. There are many types of charts, but in this class we'll focus on simple column, line, and pie charts. There are examples of other charts near the end of this handouts.

The first thing to know is the data has to be organized so Excel can understand what you are trying to chart. Excel will chart your data selection or your connected data range. As long as there are no blank columns and no blank rows within your dataset, you can skip selecting the cells.



Here is a dataset we will use in class:

Item	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Pants	456	489	423	468
Shoes	498	435	472	436
Socks	128	168	157	138
Blouses	579	498	531	589
Hats	126	129	123	119

This is a structured collection of related data set in a table format. When plotted onto a clustered column chart, like the one shown above, the titles in the first column of the dataset appear along our category axis. The titles in the first row appear within the legend. The values are represented by the height of each column.

Line charts are usually set up to go across a period of time, think *Time Line*. For this chart I've used the **Switch Row Column** tool so we can see the trend of the sales through the year. In this case our first column titles appear in the legend, and the first row of titles appears in our category axis.

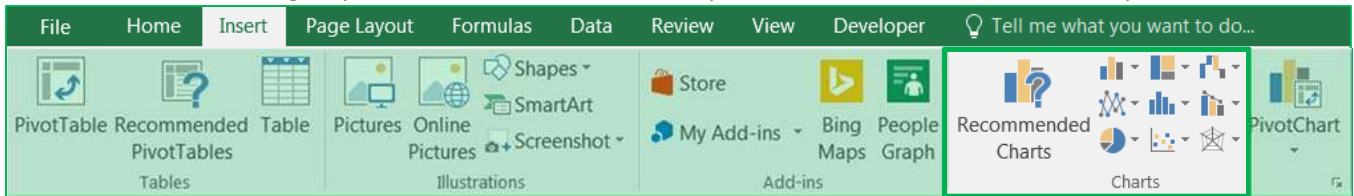
Pie charts are usually created to display the breakdown of the total values within the whole. Pie charts can only be based on one set of data. When you try to create one with the above dataset, you will only see the first value set appear within the chart. If you want to go to an extreme and have all four quarters show, try using a *Doughnut* chart.



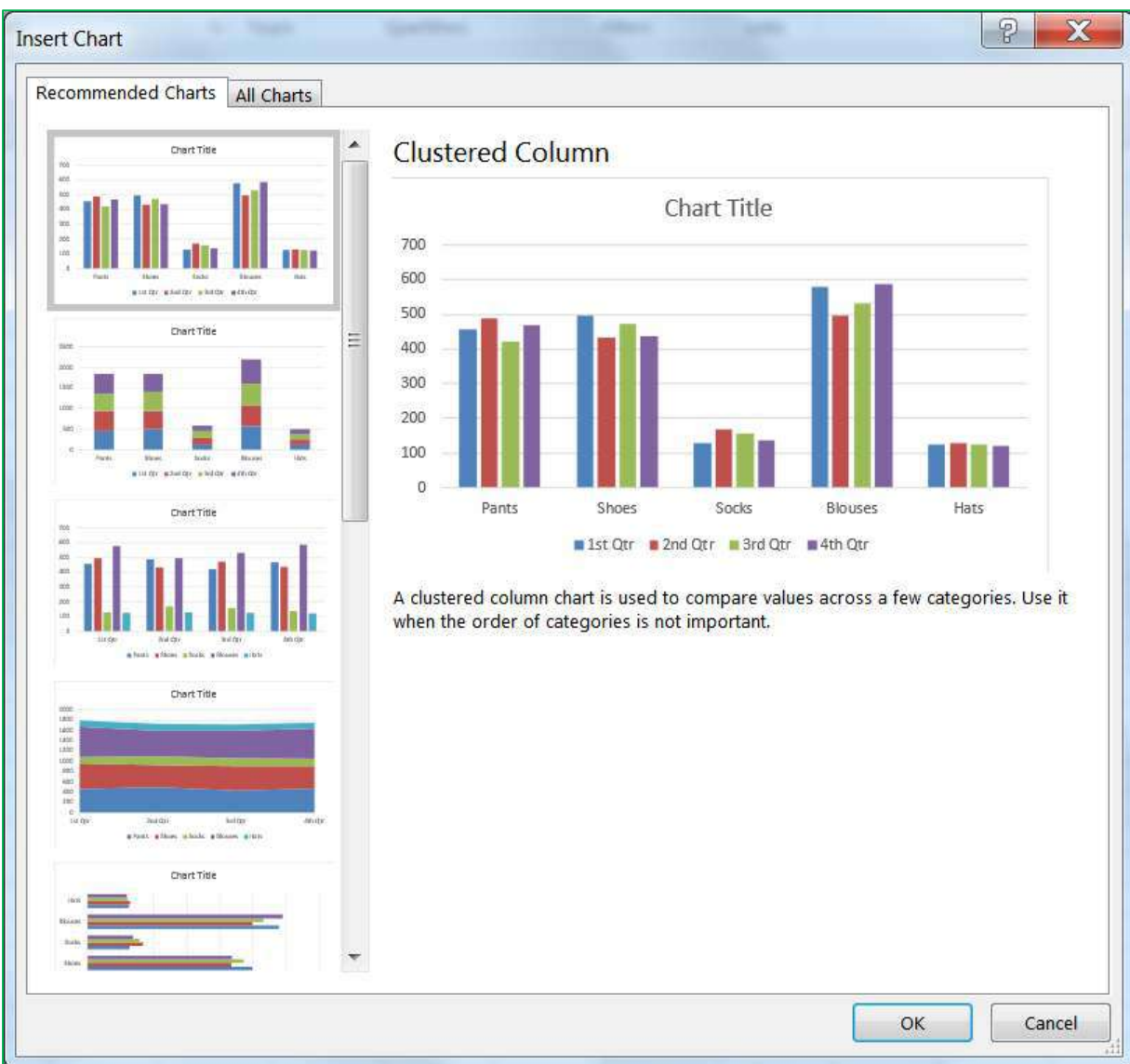
## Creating a Chart

To create a chart make sure your cursor is in the dataset you would like to plot. If you want a subset of the dataset, select that portion. You can use your Ctrl key to add to a current selection.

You will find the **Charts** group on the **Insert** tab. Click on any small chart button to see a list of possible charts.

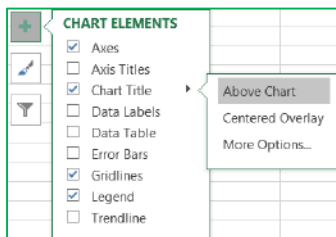
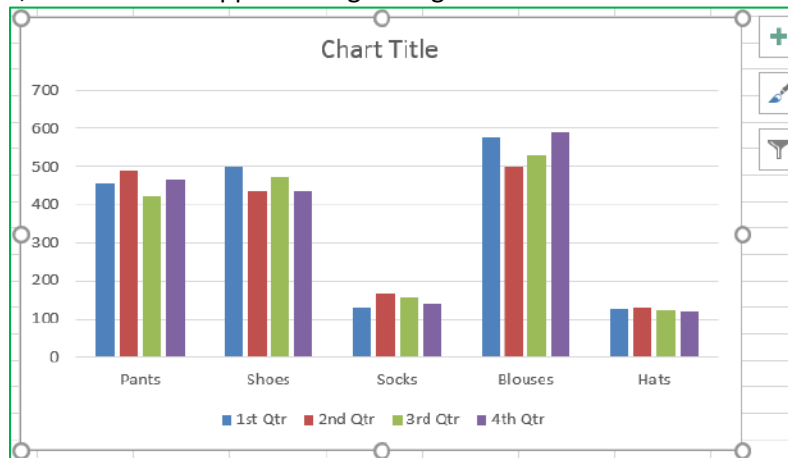


If you are unsure of the best chart option for your data use the **Recommend Charts** button. It will open the Insert Chart window shown here.

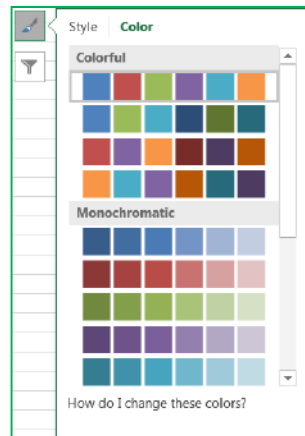


## Chart Tools

When you select a chart, three buttons appear along the right side of the selection.



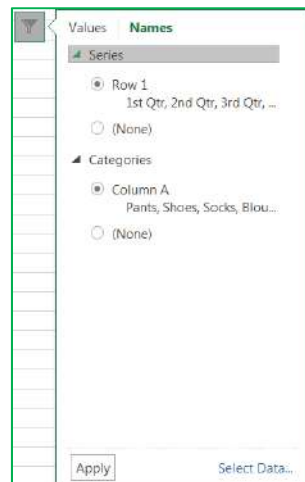
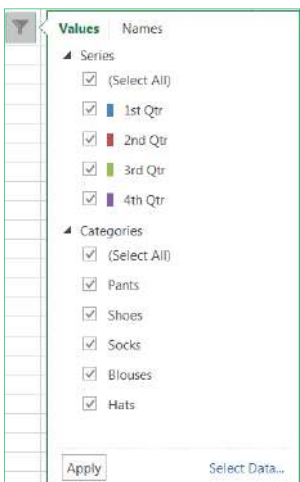
The plus sign is the **Add Chart Element** button. This option is used to add and remove different pieces of your chart. The list of options will vary depending on the type of chart. For example, a pie chart will not have a set of category axis titles. As you hover your mouse over each option, you will see a small arrow head pointing to the right. This will open another menu with more detailed choices. Each menu also has a "More Options..." button which will open a Format Pane on to customize each chart element.



There is a *Chart Style Gallery* and a *Colors* menu on the *Design* tab, but the **Chart Styles** button, the paint brush next to the chart, offers the same options.

If you are patient while you hover over each option, Excel will provide you with a Live Preview of the result.

The **Color** options are available at the top of the menu.



The third button is a funnel. This is a **Chart Filters** button.

The **Values** group allows you to add and remove data points from the chart.

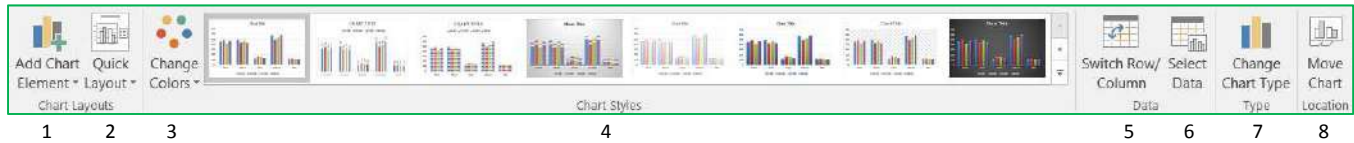
The **Names** page allows you to change the labels that appear in the legend (series) and axis titles (category).

The **Select Data...** option at the bottom of the window opens the same window as the *Select Data* button on the *Design* tab. From there you can change or adjust the range of cells used to create this chart.

## Chart Tool Tabs

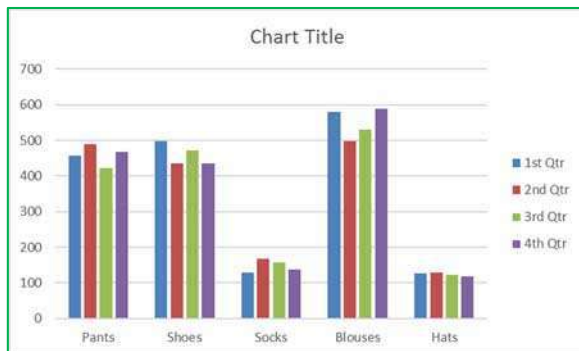
When a chart is selected two chart tool tabs appear at the end of the ribbon, **Design** and **Format**.

### Design Tab

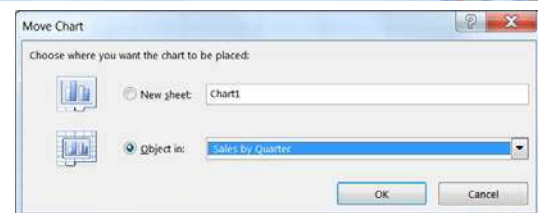


1. **Add Chart Element** – A menu of chart elements that can be added or removed to the chart. Each option will have an expand arrow at the end of the element name that will provide specifics and a **More Options** button to open the Format Pane. This is the same as the Add Chart Element button that appears next to the selected chart.
2. **Quick Layout** – A variety of layouts that offer suggested views and choices that adjust the chart elements such as adding a title, varying the space between columns, and moving the legend.
3. **Change Colors** – Different colors that can be applied to your chart. Changing the Theme on the *Page Layout* tab will give you a different sets of colors.
4. **Chart Style Gallery** – Different chart styles that can be applied to your chart. Because Excel automatically adjusts the Ribbon to fit on your screen, your copy of Excel may show less options than the picture above. Use the scroll arrows and open menu buttons at the right side of the gallery for more.
5. **Switch Row/Column** – Changes the direction the chart looks at the data. In our column chart, each column is plotted on the chart, when we **Switch** each row is plotted. We are swapping the category labels with the legend labels.

Item	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Pants	456	489	423	468
Shoes	498	435	472	436
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Hats	126	129	123	119



6. **Select Data** – Opens a Select Data Source window where you can customize the source of the chart data, even edit the labels. Use this window to reorder your legend and change how Line charts deal with blank cell values.
7. **Change Chart Type** – Opens Insert Chart window where you can change to other chart types. If you have multiple series you can change each to be different chart type by choosing the **Combo** chart type from the bottom of the left pane.
8. **Move Chart** – By default when you create a chart it is placed on the same worksheet as your data set. You can move the chart to its own worksheet or to any existing worksheet with the workbook.



## Format Tab



### 1. Current Selection

- Chart Elements – This box shows the currently selected Chart Element, and the menu provides a list of the major chart elements. Choose an item from this list to select that element.
- Format Selection – Opens the Format Pane based on the current selection shown in the Chart Elements box.
- Reset to Match Style – Changes the current selection to match the original style of the chart.

### 2. Insert Shape

- Shape Gallery – Use this gallery to find a shape such as a block arrow to add to your chart.
- Change Shape – Use this tool to change the current shape to a different one, perhaps a rectangle into a rounded rectangle.



### 3. Shape Styles

- Style Gallery – Different shape styles, options will vary based on the current selection.
- Shape Fill – Menu of the most common fill colors and options, such as pictures and textures. For more options, open the Format Pane.
- Shape Outline – Menu of the most common outline colors and options, such as dashes and arrows. For more options open the Format Pane.
- Shape Effects – Menu of the most common shape effects, such as shadows. For more options open the Format Pane.



### 4. WordArt Styles

- WordArt Gallery – Different WordArt styles
- Text Fill – Menu of the most common fill colors and options, such as pictures and textures.
- Text Outline – Menu of the most common outline colors and options, such as dashes and line weight.
- Text Effects – Menu of the most common Text effects, such as shadows. For more options open the Format Pane.



- Arrange** – Change the alignment and arrangement of multiple charts. Use the **Shift** key to select more than one chart at a time.
- Size** – Change the height and width of the chart.

## Format Pane

There are multiple ways to open the Format Pane.

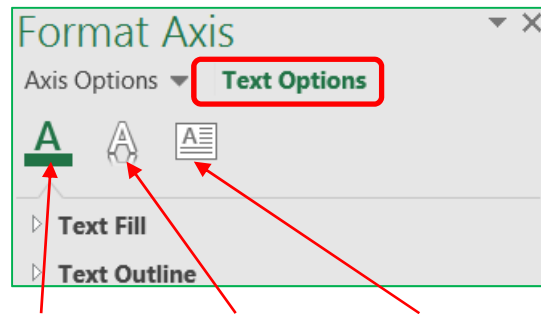
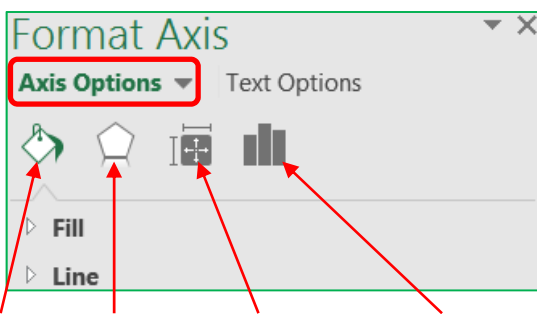
- Click on the **Format Selection** button in the *Format* tab
- Click on **More** option from any menu
- Right-click on a chart element and choose **Format...**
- Double-click on a chart element

The format pane can remain open for as long as you need it. The properties shown change depending on the current selection. The current selection is shown on the Format tab and in the title of the Format Pane.

The pane can be pulled free from the side by dragging the title toward the middle of the window. To return the pane to the side of the window drag it back into place or double-click the title of the Format Pane.

To close the pane, click on the X in the upper right hand corner. If you accidentally close the pane, use any method above to reopen it.

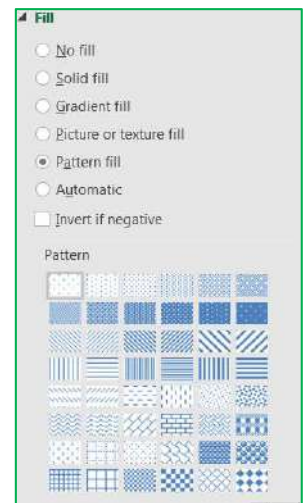
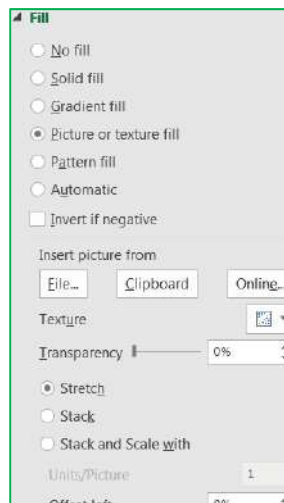
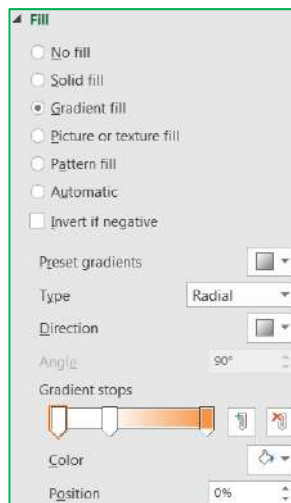
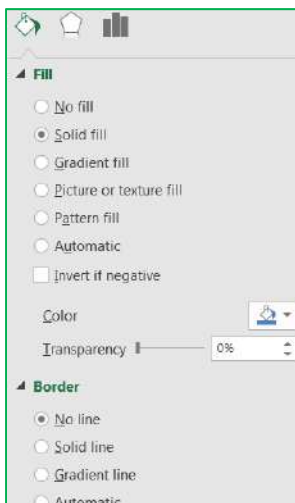
Within the Format Pane, click on each icon to see the subset of properties. Click on the expand arrow in front of the options to see the relevant properties.



**Fill & Line**   **Effects**   **Size & Properties**   **Options**   **Text Fill & Outline**   **Text Effects**   **Text Box Options**

The Fill & Line and Effects options are the same for all the of the chart elements. If an option cannot be applied to that chart element, Excel will disable (grey out) that option.

Below are the fill options for a Chart Element. Each **Fill** choice provides a new set of options.






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## **How do I ...?**


### ***Change Axis Numbers***

Select the Axis by clicking on a number in the area. Open the Format pane, be sure the title says **Format Axis**. Click on the Options button. 

From here you can:

- Change the **Minimum** and **Maximum** numbers shown. These can be greater than the minimum and less than the maximum if you want.
- Change the **Major** unit, this is how the displayed number is chosen. If the major unit is 100 the chart axis will read 100, 200, 300. If it's 25 the chart will show 25, 50, 75.
- Change the **Display Units** to Thousands, Millions, Billions. This will change the unit shown in the labels and data tables as well.
- Change the **Format** of the numbers; number of decimals, include a dollar sign, etc.

### ***Change Distance Between Columns***


Select any column. Open the Format pane, be sure the title says **Format Data Series**. Click on the Options button. 

From here you can:

- Change the selected series to be on a **secondary axis**
- Change the distance the series **overlap**
- Change the **width between** the each category grouping

### ***Explode a Pie Chart***


**In the chart:** Hover over a pie wedge. Click and drag the piece away from the center. To move one piece at a time, select the single pie wedge first, and then move it from the middle.

**In the properties:** Select a pie wedge. Open the Format pane, be sure the title says **Format Data Series**. Click on the Options button. 

From here you can:

- Change the rotation without changing the order of the data
- Change the explosion, how close the wedges are to each other

### ***Add Trendlines and Error Bars***

Select the chart. Click on the Add Chart Element button in the Design tab, or on the  button next to the chart.

You can add your own custom error bars, if needed, from the error bar options. You do have to format one series of error bars at a time.

### ***Make Charts the Same Size***

Use the Height and Width properties found on the Format tab in the ribbon, or on the Format Pane for the Chart Area's Size & Options. You can use the alignment options on the format tab to make the charts line up.

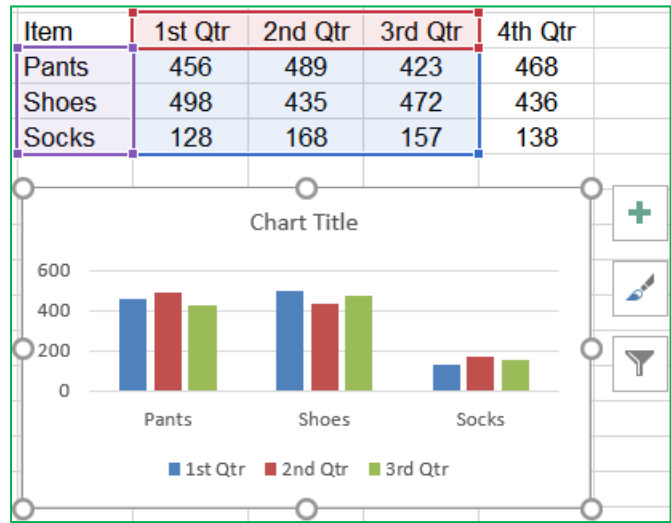
## Changing the Data Source

### From the Worksheet

When you select a chart you will see the Chart Tool tabs in the ribbon, and the three options buttons along the right side of the chart. If you can see the cells in the worksheet used for the chart you will also be able to see the data is selected and each section is shaded.

If you hover your mouse over the bottom right-hand corner of the data grouping you will get the two-way sizing arrow. If you click and drag the selection you can manually change the chart data source.

If you know you will have more categories and series you can grow the data area beyond what's showing and Excel will assign new colors and make room in the chart for the new values.

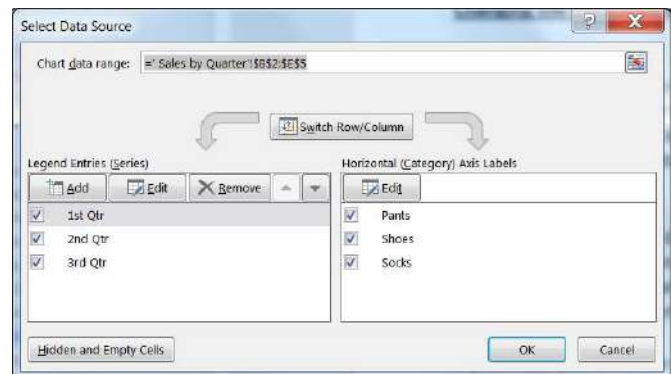


### From the Select Data Source Window

From the Chart Tools *Design* tab choose **Select Data**.

The **Chart data range** option can be a bit finicky so I recommend deleting the current range and selecting the new set from the worksheet.

The chart is initially arranged to follow the order of the data, but if you would like the legend in a different order, you can rearrange the Legend Entries using the up and down arrows.



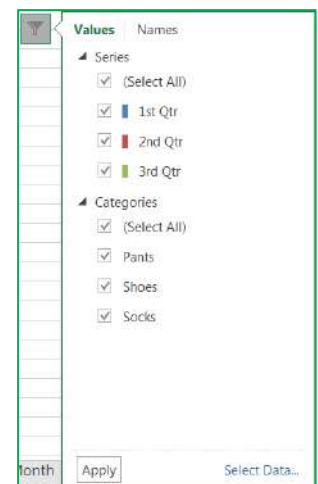
### Removing data

Both of the above options will help you add and remove data. You can manually adjust the range in the worksheet or you can select a different range from the Select Data Source window. Both are great as long as you are using a consecutive range of data.

The Select Data Source window also had a **Remove** button to delete a series from the chart. Notice there is not one for the Category/Axis labels. To be able to remove one you will need to first **Switch Row/Column**. Once you've removed the categories, **Switch Row/Column** again.

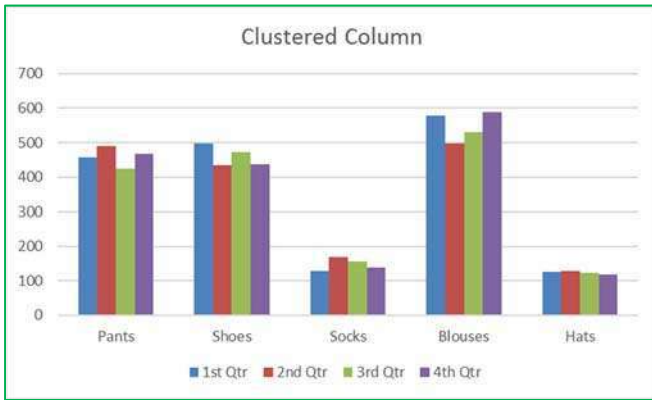
From the chart itself you can click on the series you want to remove and press **Delete** on the keyboard. You can only delete the series, so the same actions apply in order to remove a category you will need to switch the row/columns first.

However, we now have a Filters button along the side of the selected chart. From here we can uncheck any of the values we do not want on the chart; Series and Categories. You must click the **Apply** button at the bottom of the menu for the filter to take effect.

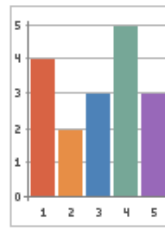


## Types of Charts

### Column and Bar Charts

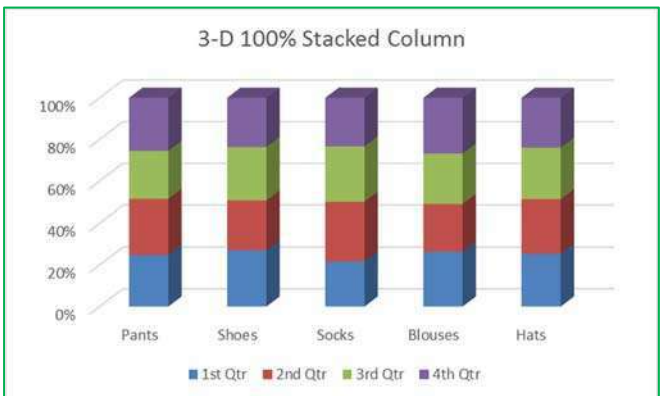
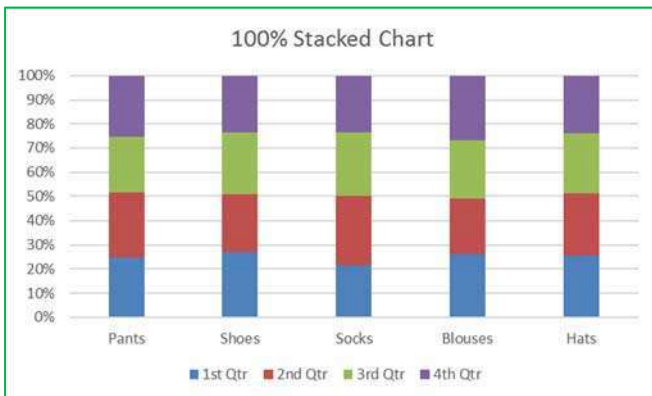
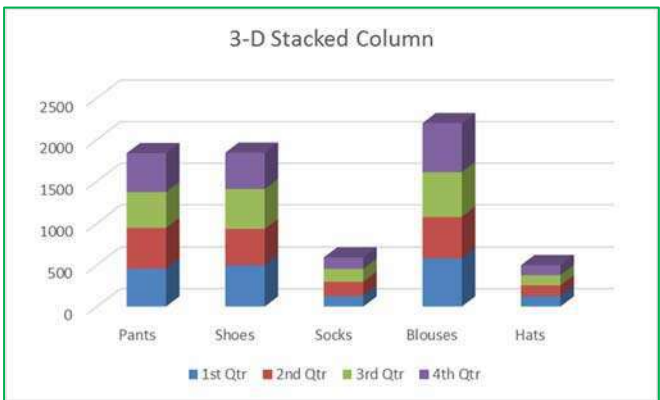
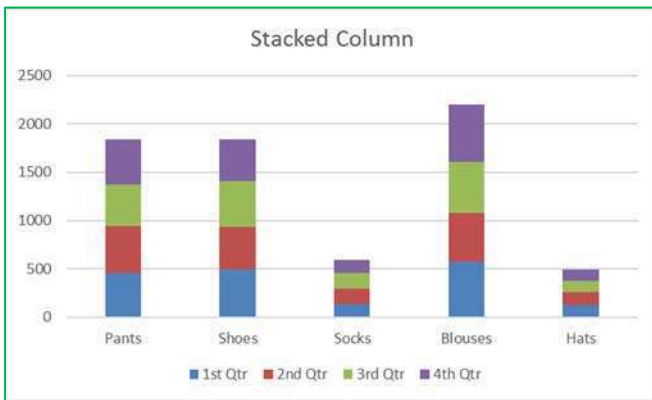
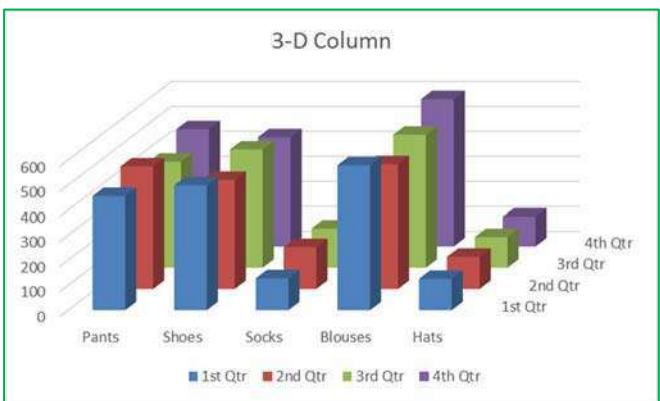
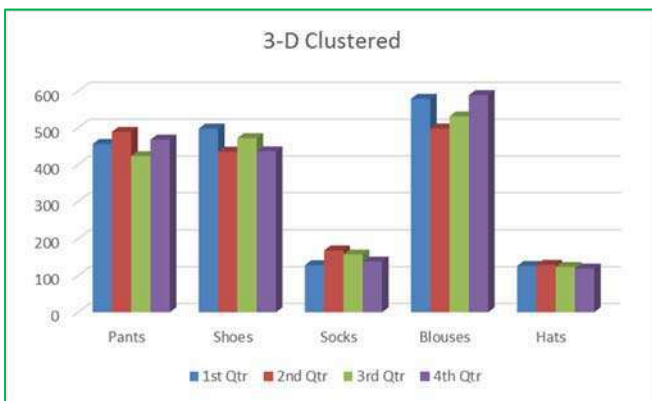


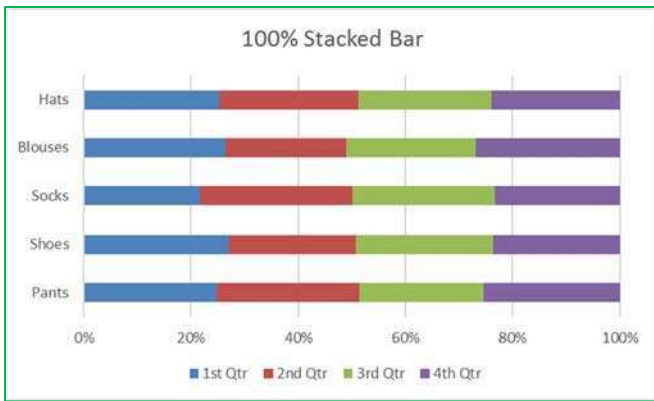
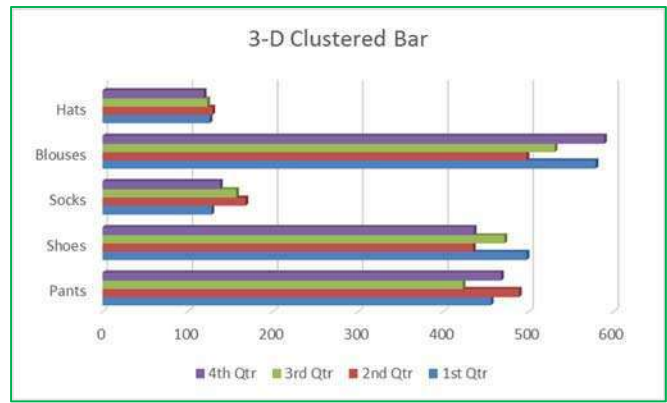
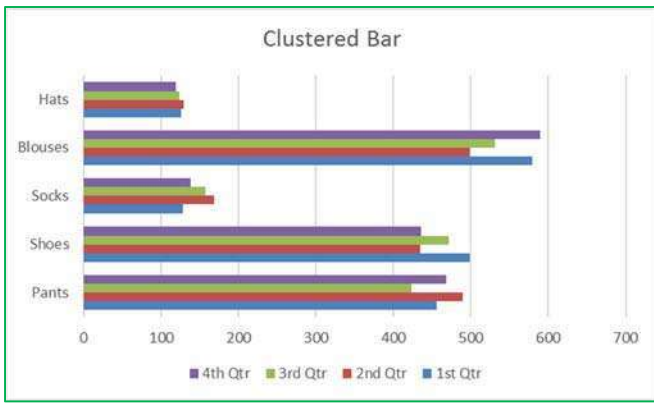
### Insert Column or Bar Chart



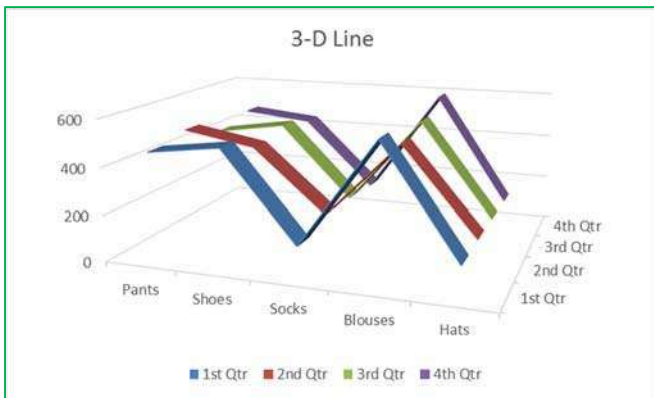
Use this chart type to visually compare values across a few categories.

Click the arrow to see the different types of column and bar charts available and pause the pointer on the icons to see a preview in your document.





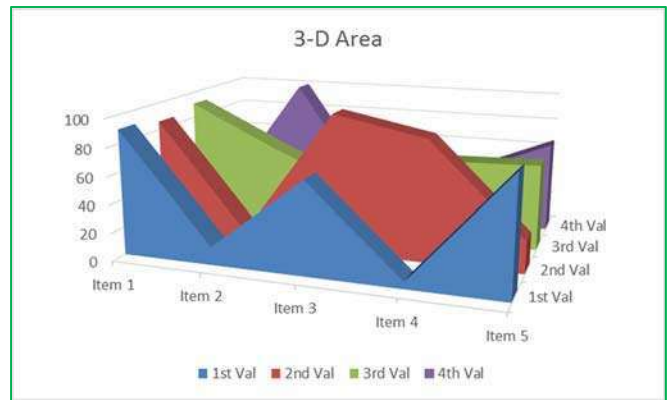
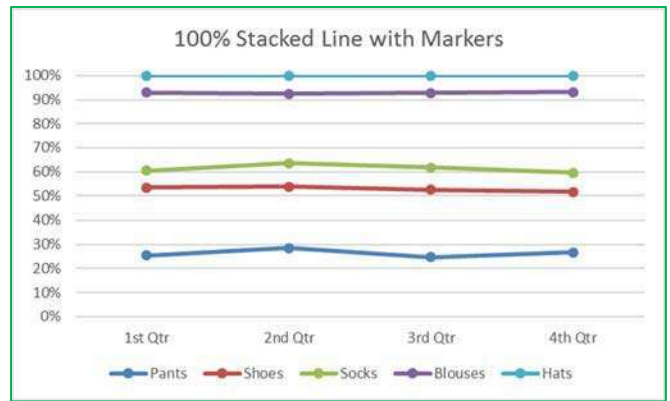
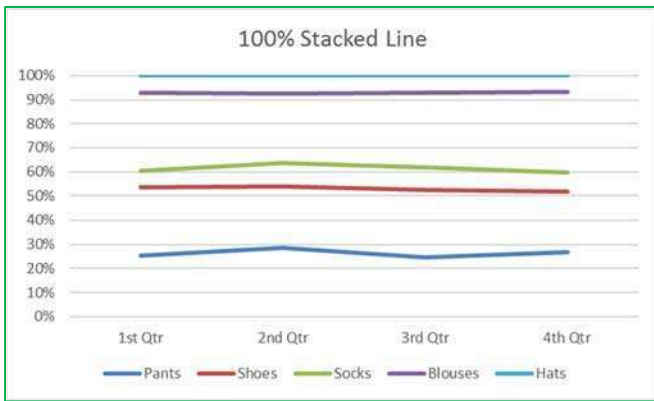
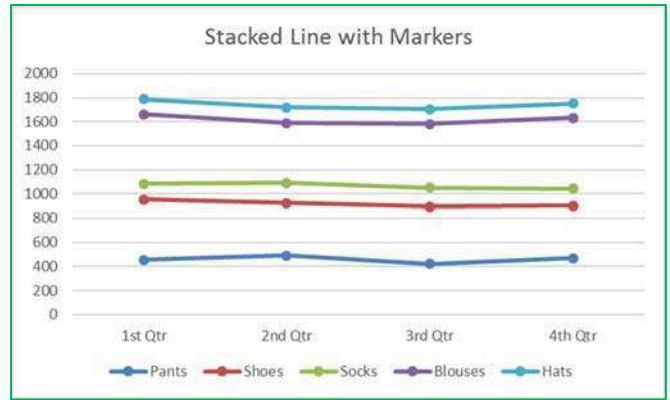
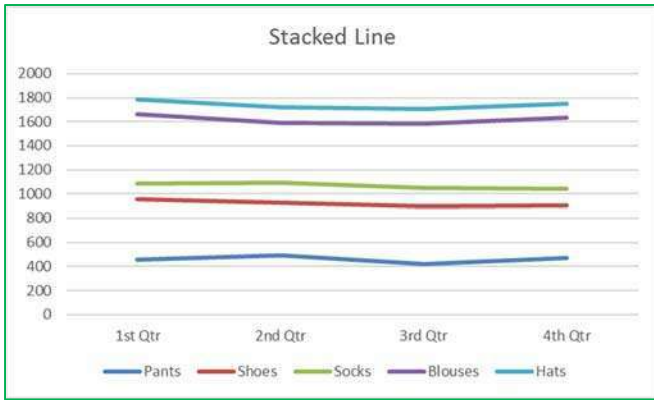
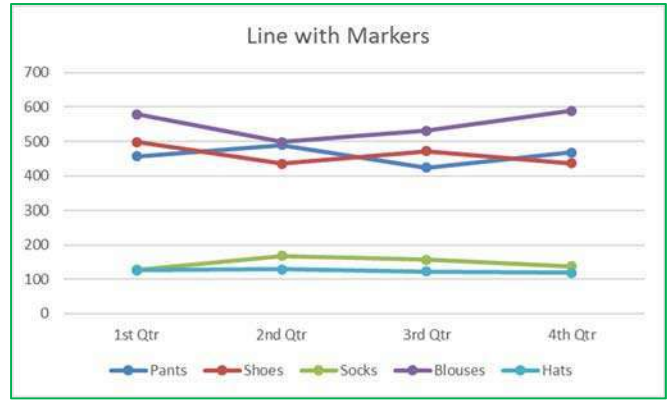
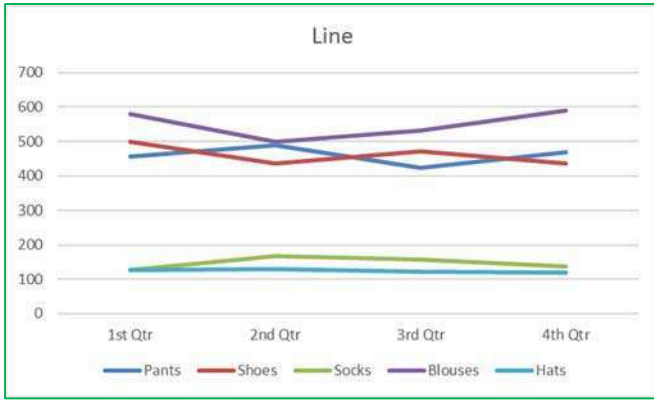
**Line and Area Charts**

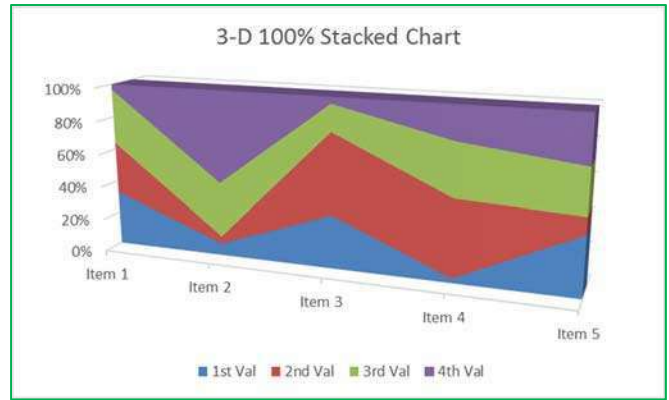
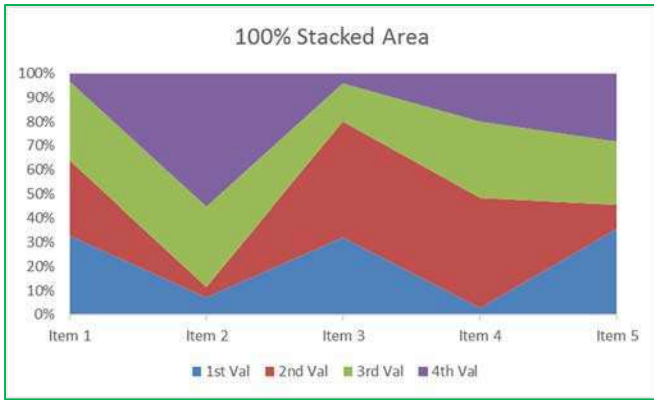
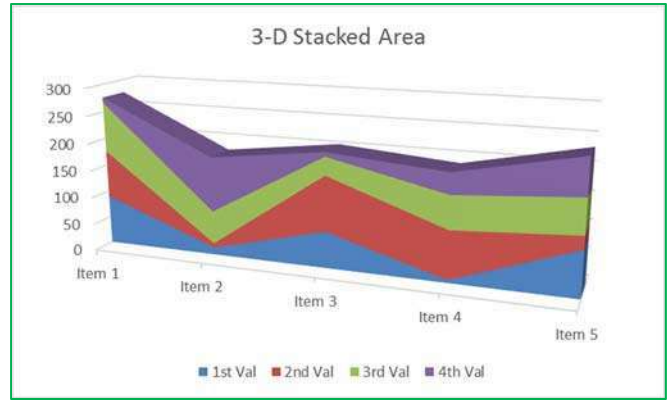
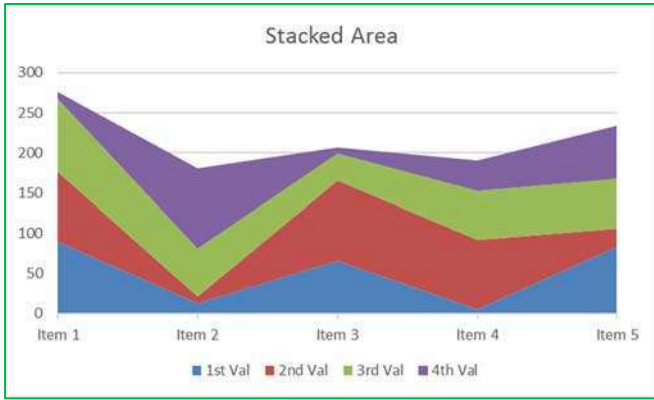


**Insert Line or Area Chart**

Use this chart type to show trends over time (years, months, and days) or categories.

Click the arrow to see the different types of line and area charts available and pause the pointer on the icons to see a preview in your document.





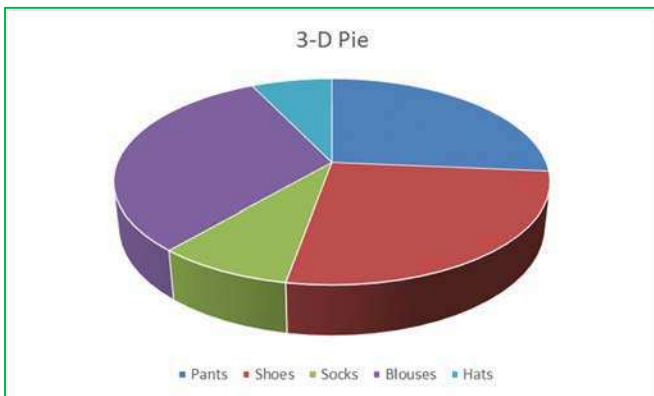
## Pie and Donut Charts

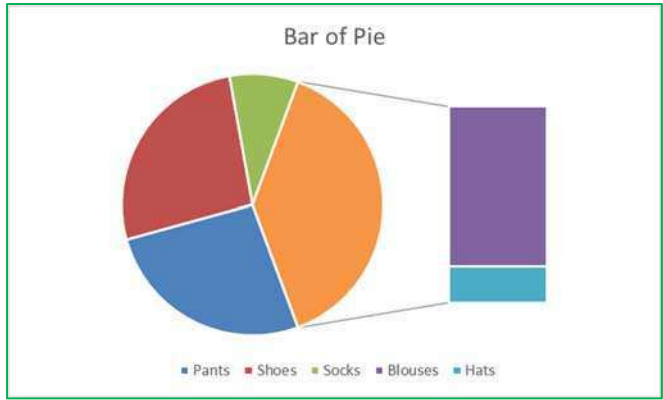
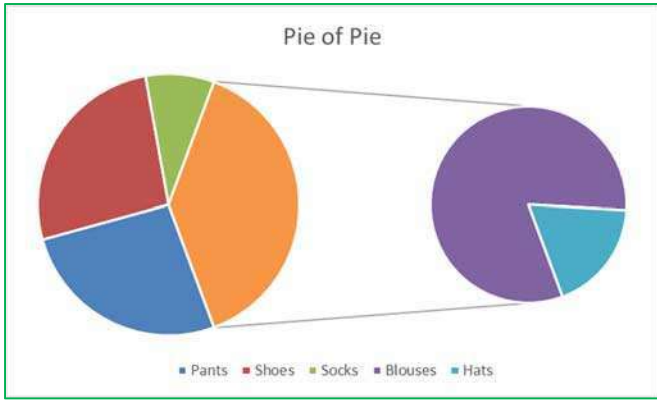


**Insert Pie or Doughnut Chart**

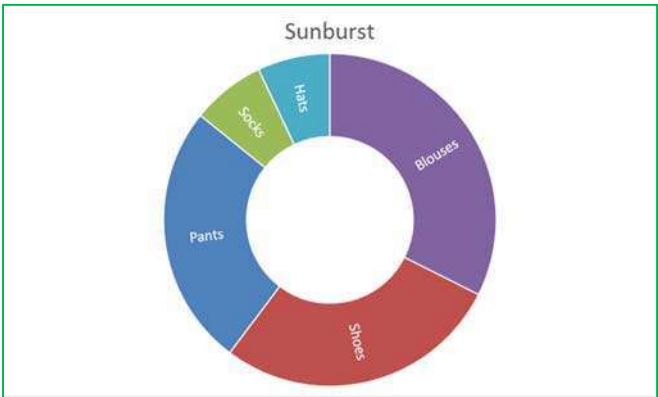
Use this chart type to show proportions of a whole. Use it when the total of your numbers is 100%.

Click the arrow to see the different types of pie and doughnut charts available and pause the pointer on the icons to see a preview in your document.





### Hierarchy Chart



#### Insert Hierarchy Chart

Use this chart type to compare parts to a whole, or when several columns of categories form a hierarchy.

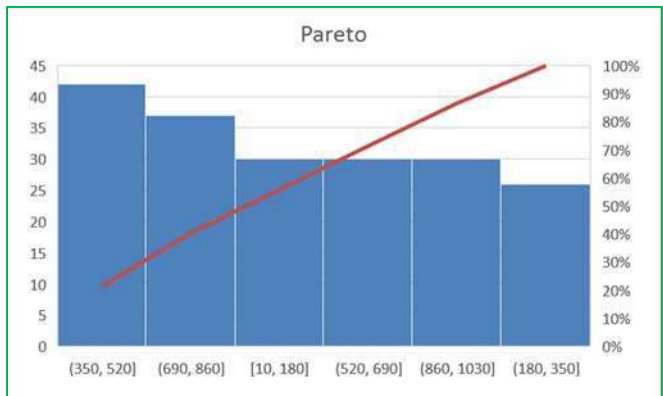
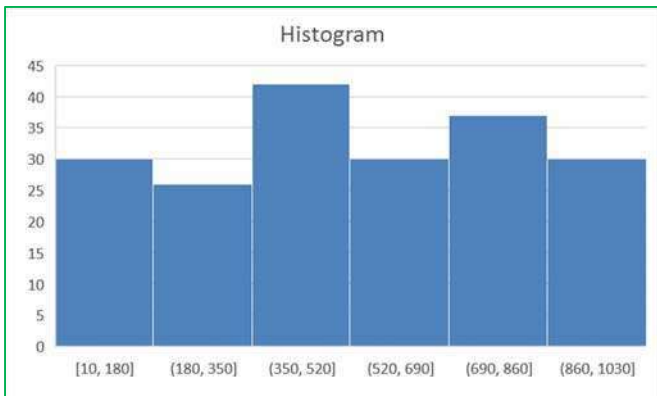
Click the arrow to see the different types of hierarchy charts available and point to the icons to see a preview in your document.

#### Insert Statistic Chart

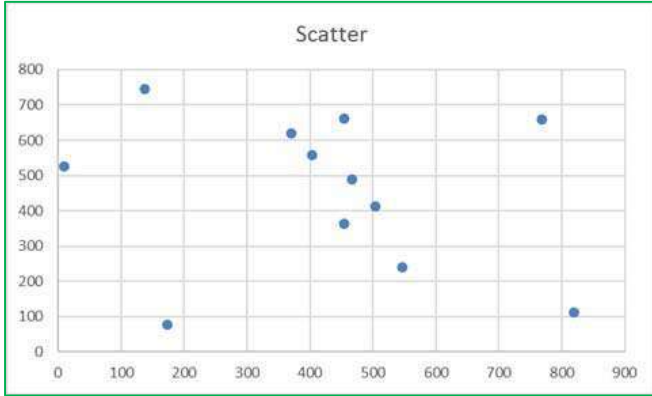
Use this chart type to show statistical analysis of your data.

Click the arrow to see the different types of statistic charts and pause the pointer on the icons to see a preview in your document.

### Statistic Charts



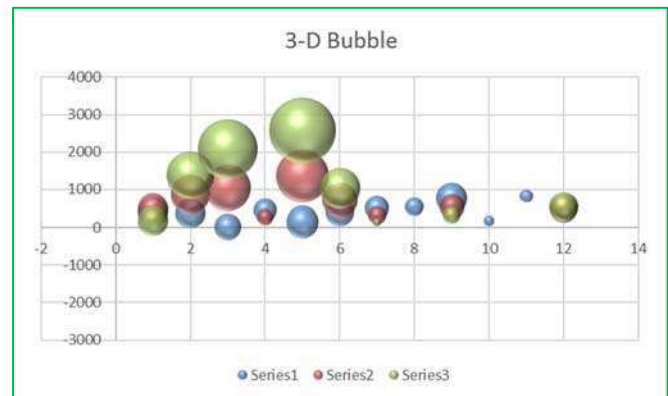
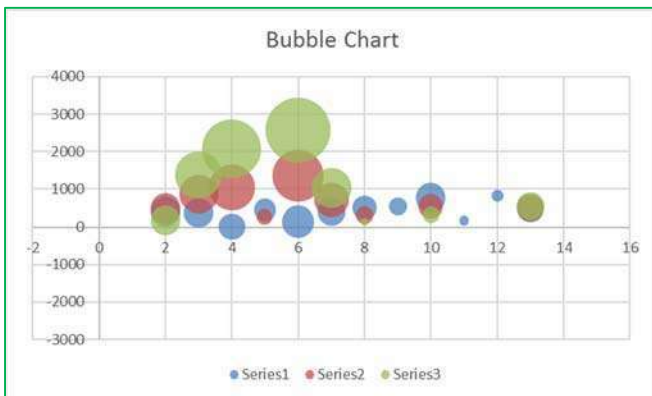
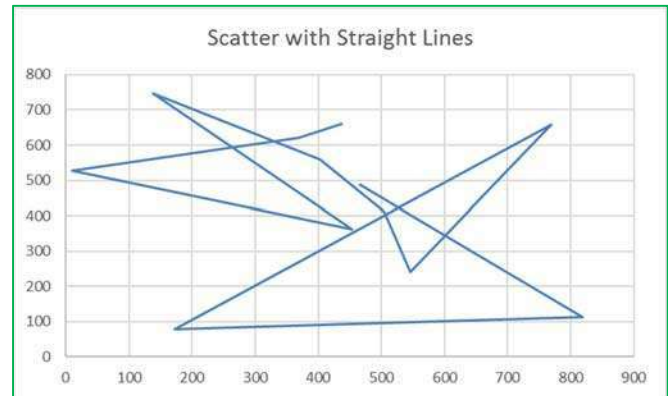
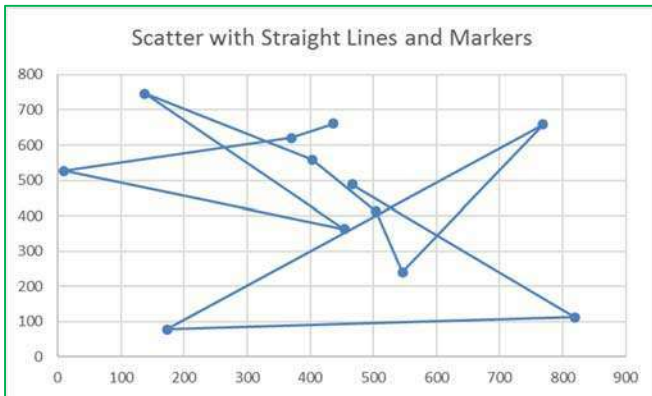
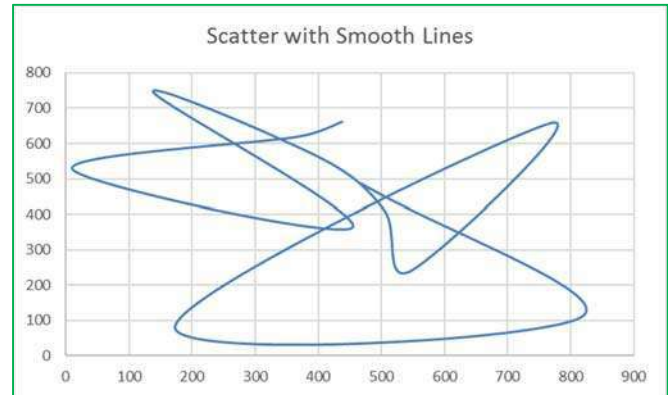
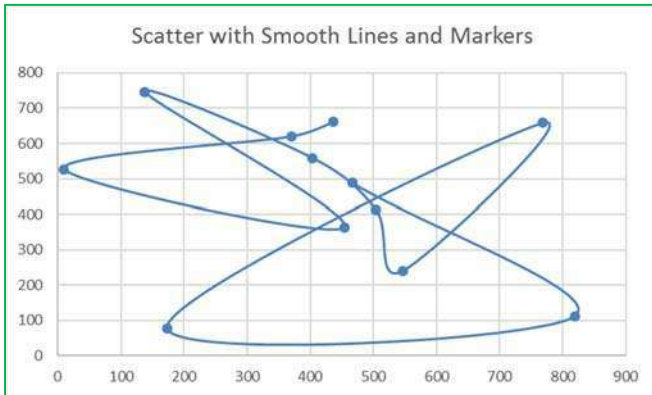
## Scatter (X,Y) and Bubble Charts



### Insert Scatter (X, Y) or Bubble Chart

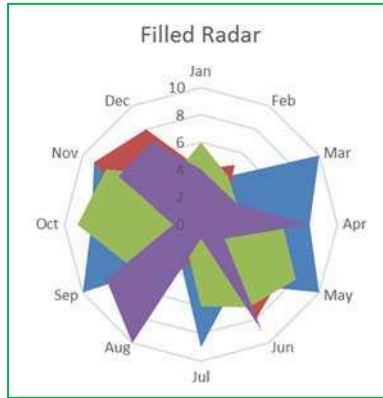
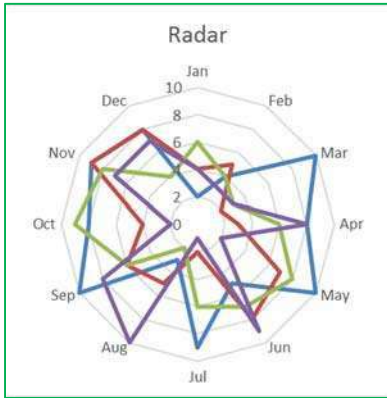
Use this chart type to show the relationship between sets of values.

Click the arrow to see the different types of scatter and bubble charts available and pause the pointer on the icons to see a preview in your document.

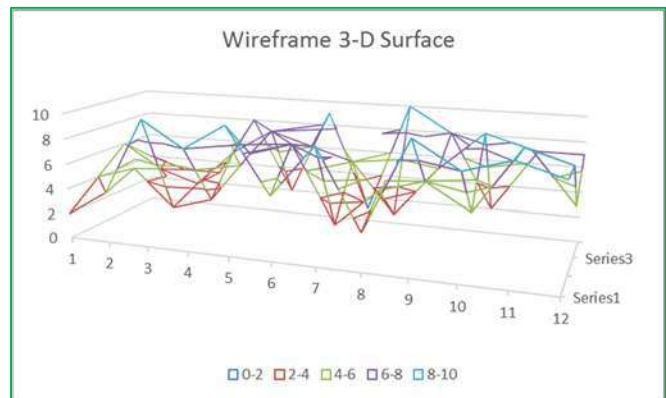
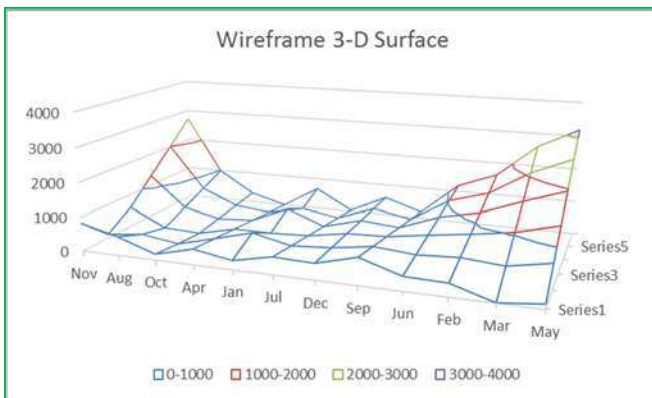
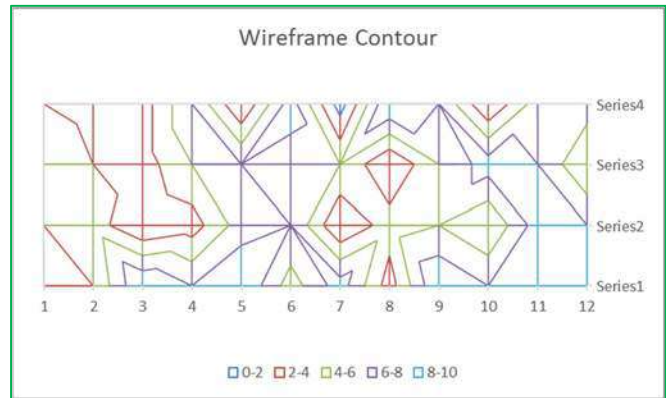
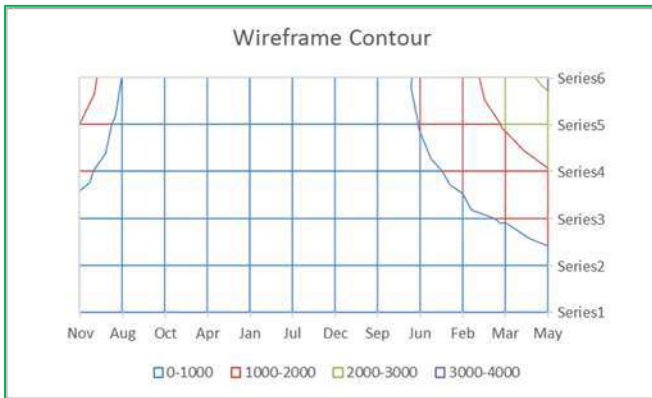
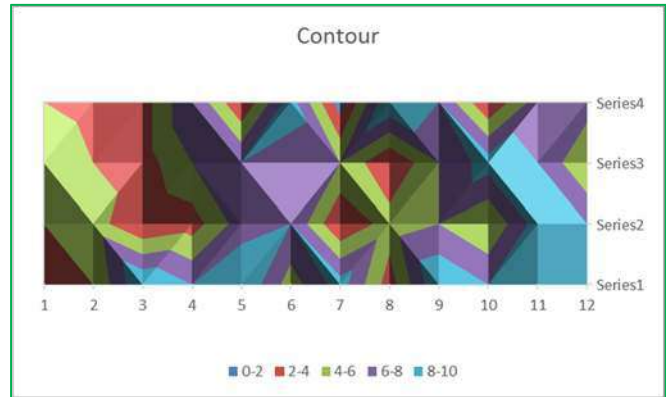
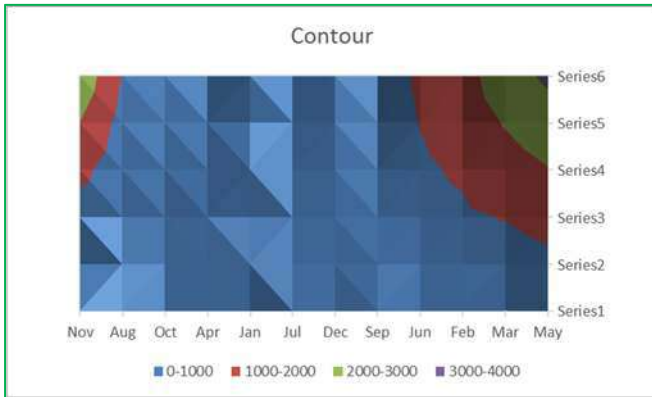




**Radar and Surface Charts**



**Insert Surface or Radar Chart**  
 Click the arrow to see the different types of surface and radar charts available and pause the pointer on the icons to see a preview in your document.



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## Class Exercise

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### Explore workbook

- Open ChartData.xlsx
- View each worksheet
- Discuss 'consistent' range of data

	COLUMN TITLE	COLUMN TITLE
ROW TITLE	DATA	DATA
ROW TITLE	DATA	DATA

---

### Create Chart

- Turn to Sheet 'Sales by Quarter'
- Turn to the **Insert** Tab
- Click on Recommended Charts
  - o Click on each suggestion to see a preview of our dataset
  - o Click on the ALL CHARTS page at the top of the window and explore the options
  - o Choose first **Column Chart**
- Chart Tool tabs – **Design** and **Format**
- Click outside of chart to deselect
  - o Tabs disappear

---

### Design Tab

- Add Chart Element
  - o **Add:** Data Labels on the Outside End
  - o **Remove:** Chart Title
  - o **Move:** Legend to the top
- Explore different Quick Layouts
  - o Choose first layout (title above, legend on right)
- Explore different Chart Colors
- Explore different Chart Styles
  - o Notice it changes the Chart Layout
  - o Return to the Quick Layout menu and choose the first one again
- Switch Row/Column
  - o Notice it's switching the legend with the category axis
  - o Leave the chart with quarter in the legend
- Select Data
  - o Rearrange legend 4<sup>th</sup> Qtr - 1<sup>st</sup> Qtr
  - o Cancel the window
- Change Chart Type to different options
  - o Reset it back to the original, first column chart
- Move chart to its own sheet

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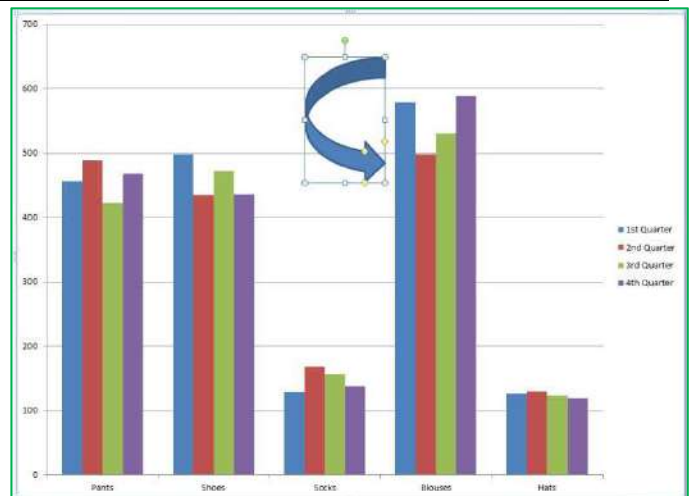
## Format Tab – Current Selection

- Select Legend from Current Selection dropdown
- Click **Format Selection** button
  - Legend Options
    - Move legend to different positions
    - Try it with overlapping the chart
  - Fill
    - Solid Fill
    - Gradient Fill
      - Preset Colors
    - Picture or Texture Fill
      - Textures
      - Insert a file
  - Border
    - Solid line
    - Increase width
    - Gradient
  - Effects
    - Add a Shadow
    - Add a Glow
- In the **Format** tab in the ribbon, click **Reset to Match Style**

---

## Layout Tab – Insert

- Insert Shapes
  - Insert Block Arrow
  - Uses yellow diamond to modify arrow
  - Use green circle to rotate
  - Delete
- Insert Text Box
  - Type inside
  - Move around
  - Delete



---

## Delete Chart

- Right-click on Chart 1 Sheet name
- Select Delete
- Confirm deletion

---

## Create Chart

- Turn to Sheet 'Sales by Year
- Insert Tab, Chart Group, Column
  - o Choose first Column Chart
- Move to a new worksheet
- Change Font
  - o Right-click on Category Axis (pants, shoes...)
  - o Choose Font, sent size to 14
  - o Undo
  - o Right-click in Chart Area (blank space)
  - o Choose Font, sent size to 14
- Change Title to read "Yearly Sales
- Add Minor Horizontal Gridlines
  - o So you have Major and Minor lines

---

## Format Tab - Styles

- Select Major Gridlines
- Change Shape Styles
  - o Use Preset options
  - o Use Shape Outline
  - o Use Shape Effects
- Select a column
- Change Shape Styles
  - o Use Preset options
  - o Use Shape Fill
  - o Use Shape Outline
  - o Use Shape Effects
- Format
  - o Fill, Outline, and Effects for each column, independently
  - o Fill for Plot Area
  - o Fill for Chart Area
- Format Chart Title
  - o Change font size to 40
  - o See Shape Styles, don't change it
  - o See WordArt Styles
    - Text Fill
    - Text Outline
    - Text Effects

---

### Save as Template

*Saving the template then closing the file without saving it.*

- Right-click on the chart
- Save as Template...
  - o 'Chart1' is fine
- Exit the file
  - o Don't save

---

### Use Template

- Reopen the Charts file
- Turn to Sheet 'Sales by Year'
- Insert Tab, Chart Group, Column, First chart
- Design Tab - > Change Chart Type
- Templates
  - o First option in pane on left
- Choose Chart1, Click OK
- Delete Chart

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### Default Chart

- In Sheet 'Sales by year' Press F11

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### Modify Default Chart

- In new chart, Design Tab - > Change Chart Type
- Right-click on the Template
- Set as Default Chart
  - o Click OK
- Return to sheet 'Sales by year'
- Press F11
- In Sheet 'Sales by Quarter' Press F11
  - o Note only the first column was formatted
- Close but don't save the file

---

### Manually Changing Data Ranges

- Insert a column chart on Sheet 'Sales by Quarter'
- Notice color Coding around original data
- Use fill handle to change the selection
  - o If the colors go away, click inside the chart again.
  - o Adjust the chart to include only the data

---

### Remove Data

- Click on a column for 4<sup>th</sup> Quarter
  - o Press Delete on the keyboard
- Click on a column for 2<sup>th</sup> Quarter
  - o Press Delete on the keyboard
- Notice the color grouping around our dataset is gone
- Switch row/columns to remove your shoes
- Switch row/columns back
- Open the filters button. There is only the first and third quarter, and no shoes
- Delete Chart
  
- Insert a column chart
- Use the Filter to remove second and fourth quarter, and remove your shoes
- Use the Filter to add them back in

---

### Chart Specific Data

- Select Items through 3<sup>rd</sup> Quarter, A1:D6
- Insert a column chart
- Delete 2<sup>th</sup> Quarter
- Delete Chart
  
- Select Items through 1<sup>st</sup> Quarter, A1:B6
- Use **Ctrl** key to select 3<sup>rd</sup> Quarter, D1:D6
- Insert a Column chart
- Delete Chart

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### Pie Chart

- Turn to Sheet 'Sales by Year
- Insert Tab, Chart Group, Pie, First chart
- Remove Title & Legend
- Add labels for %, Delete labels
- Explode Pie
- Rotate Pie (in the options)
- Pull individual pieces
- Delete Chart



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### 3-D Pie Chart

- Insert a 3-D Pie chart
- Explode Pie
  - o Re-connect/Implode
- Select Plot Area from the Format Pane
- View the effects, 3-D Rotations
- Change X & Y rotations
  - o Use little scroll up and down arrows
- Uncheck Autoscale
- Change Height (% of base)
- Delete Chart

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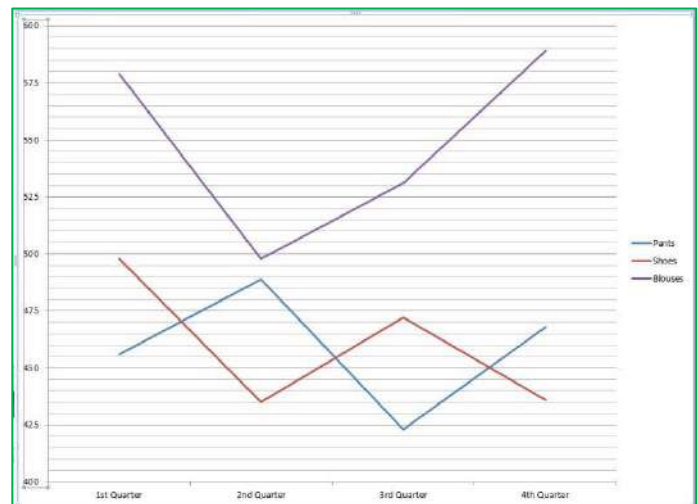
### 3-D Column Chart

- In Sheet 'Sales by Quarter'
- Insert Tab, Chart Group, Column, Last 3-D option
- Delete Legend
- Design tab - Switch Row/Columns
- Design tab – Select Data
  - o Rearrange Legend so smaller values are in the front
- Delete Chart

---

### Line Chart

- In Sheet 'Sales by Quarter'
- Insert Tab, Chart Group, Line, First option
- Design tab - Switch Row/Columns
- Remove Smaller Values
- Move to new sheet
- Format **Axis Options**
  - o Minimum 400
  - o Maximum 600
  - o Major Unit 25



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### Layout Tab - Analysis

- Trend Line
- Error Bars
  - o More Error Bar Options
  - o Fixed Value 5
- Delete Chart