University of Glasgow

Excel 2016: Introduction to Graphs and Charts

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Contents

Introduction

This session provides an introduction to creating and editing a range of Graph and Chart types using Excel 2016. Basic knowledge of Excel is advised.

Objectives

On successful completion of this course participants will be able to:

- Create Graphs and Charts
- Change general styling of charts
- Manipulate and alter the individual objects within a chart
- Change the chart type
- Alter the source data
- Save a chart as a template

Excel 2016: Introduction to Graphs and Charts

Often when you look at a large table of figures, it can be very hard to figure out what is happening with the data. Conditional formatting will help, but sometimes a picture really is worth a thousand words. Excel features powerful charting tools to help you create a more meaningful representation of your data. Here, we will learn how to create, format, and manipulate charts in Excel 2016.

1 Creating Charts:

There are many different chart types you can use to present your data. It is important that you are clear why you are using a particular type of chart to present your data

a. Recommended Charts

The latest version, Excel 2016 has a new feature that helps you to decide what kind of chart to use with your data.:

1   Highlight the data that you wish to include in your chart. You normally include both the data and the row/column titles in your selection

2   Click on the Insert tab and from the ribbon select Recommended Charts (found in the Charts group
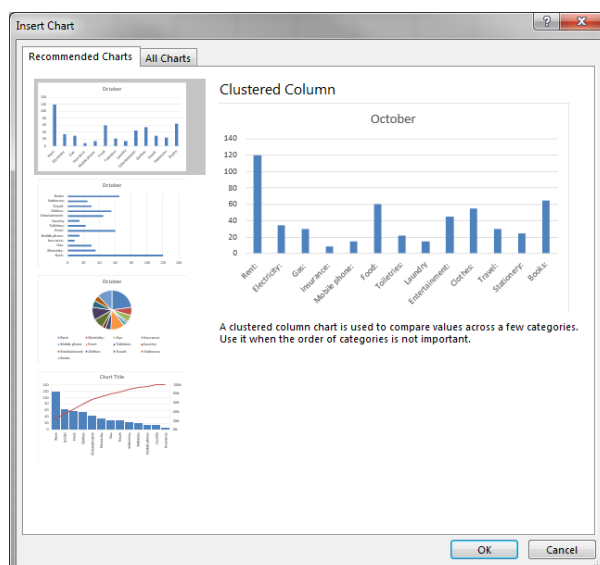
3   In the dialogue box that appears you can see a selection of recommendations on the left.

4   Clicking on any of the recommended charts in the dialogue will reveal a preview and a description of the chart. Pick a chart that represents your data well.

5   Click OK to create your choice of chart

Note: The choices that are offered to you using the **Recommended Charts** tool are based on the structure of your data. Occasionally options will be offered that are not appropriate.

b. Creating a chart manually

You may have a good idea as to the type of chart that you would like to use to present your data. If this is the case, you can create this chart directly using one of two methods

Method 1

1 Select the data to be charted, including row or column headings to be used as labels, and then

2 Access the Charts group under the Insert tab.

3 Select the chart type that you wish to use from the Charts group

4 Select from the drop down the chart sub-type that you wish to use

5 Your chart will appear in the worksheet.

6 At the same time new chart options appear on the Ribbon.

These options affect the way your chart will appear – so you should choose carefully as good choices will make it easier for others to understand what your chart represents.

Method 2

1 Use the **Insert Chart** dialog box from the Excel **Ribbon** ⌐
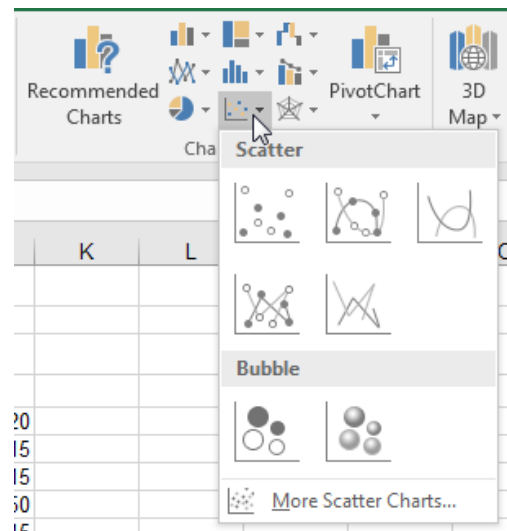
Note: this dialog box does not allow you to format the layout of charts you choose nor add labels, legends or gridlines. However, **Chart Tools** has options that allow you to do this (see below).

2 Styling Charts with the Design Tab

Once a chart has been created, it's appearance is not set in stone – you can modify everything related to the chart, including size, color, layout, visual effects, 3D effects, chart type, and even the data that was used to make the chart in the first place. In order to work with a chart, click the border surrounding the chart. Doing so will open a feature of Excel called **Contextual tabs**:
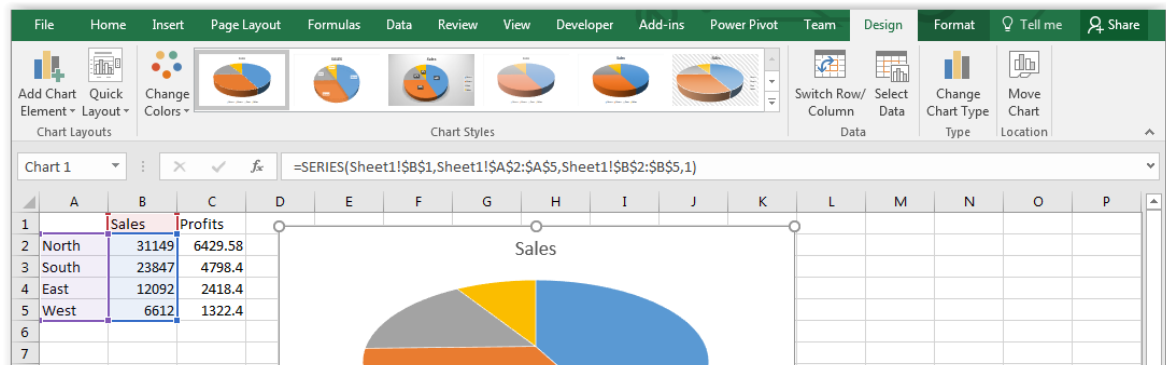

Contextual tabs appear when you are working with certain objects *(i.e., you are working in context with them)*. There are two Chart Tools tabs: **Design**, and **Format**. These two tabs are only available when you are working with a chart. If you were to click elsewhere in the worksheet *(deselect the chart)*, these tabs would disappear. Click anywhere in the chart again to bring them back.
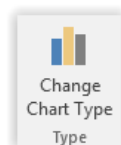
## a) The Design Tab

Let's go over the groups in the **Design tab**:

Chart Layouts — The Add Chart Element is used to create new elements such as **Data Labels, Legends, Lines** etc.
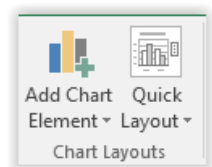

Type — Use this commands to change the type of chart or save the current chart design as a template for future charts:

Data — Use the commands in the Data group to reverse the items on the X and Y axes. (Note that this command might make the chart nonsensical.) You can also redefine the cell range that provides source data for the chart:
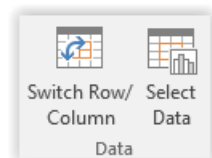

Chart Styles — Excel features a number of colourful, pre-formatted chart styles. Click the pull-down arrow in the lower right-hand corner to choose from a number of chart styles:
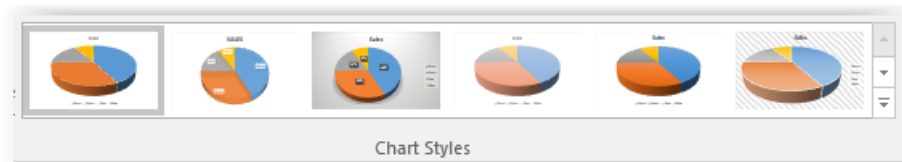
Chart Styles

Also in the **Chart Styles** group is the **Change Colors** command

You can select one of several different color combinations using this button. Be aware that the colours offered are controlled via the **Themes**, which can be selected and created from **Page Layout** tab
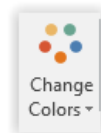
Location   Click this command to open the Move Chart dialog box. Here, you can move the chart to either a new worksheet in the workbook, or move the chart as an embedded object:
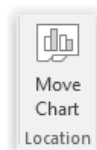
By now you will have noticed that you can customize just about anything to make it look the way you want, and charts are no different. Over the next few pages, we'll look at how to customize the different chart elements.

Each element of the chart can be formatted using the contextual tabs or by using the right-click menu. For example, right-click the chart legend and choose Format Legend.
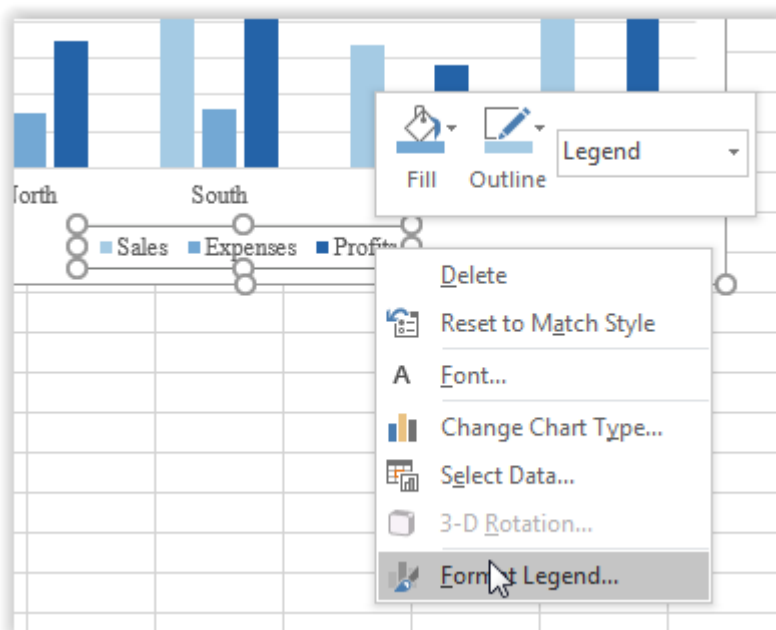
The format legend task pane will appear on the right hand side of the excel application
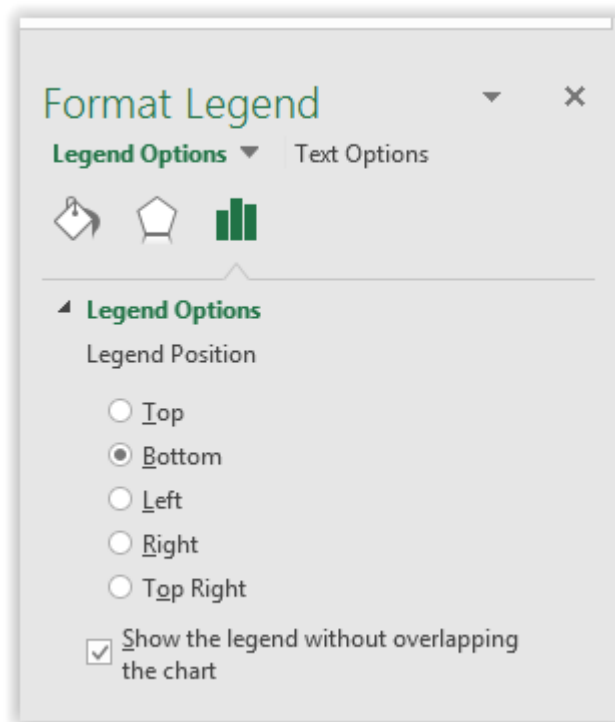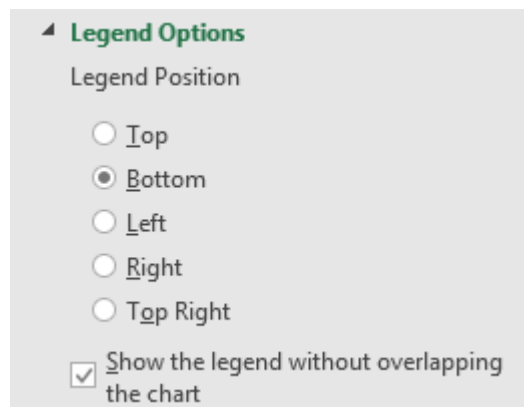
There are lots of options available to modify just the legend. In fact, each element you can right-click in a chart has formatting options that are very similar to the ones shown here, so let's go over the main categories:

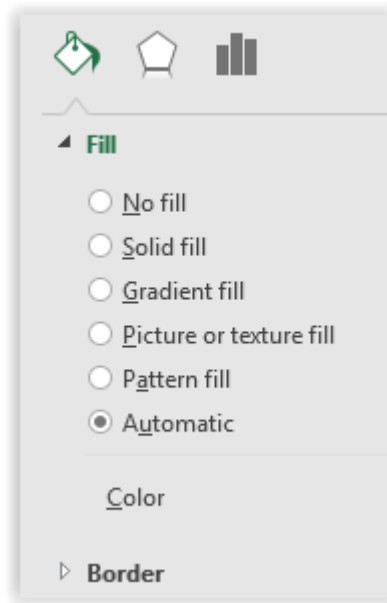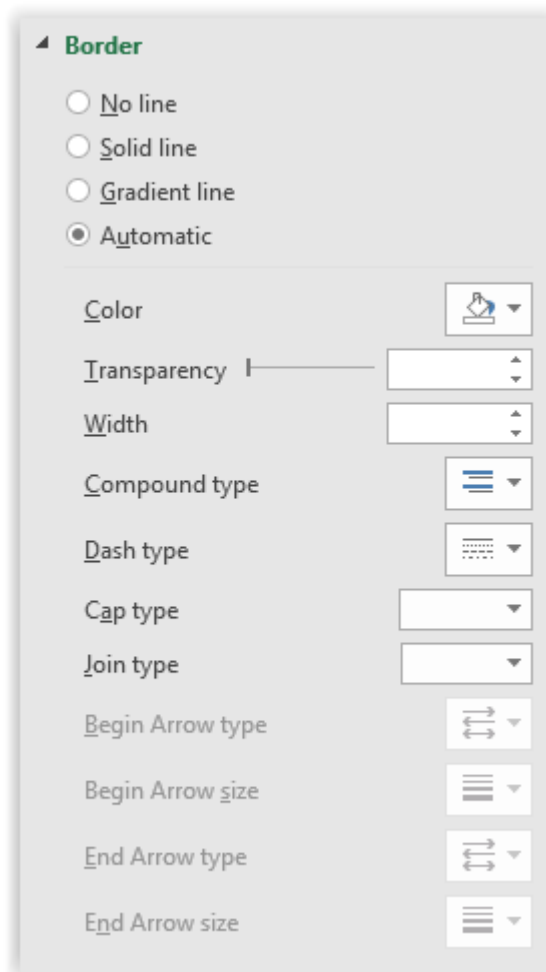**Legend Options**   Choose the legend position relative to the outside chart border:

Fill   Select from a number of colouring options for the legend. These options would help separate the legend from the rest of the chart:
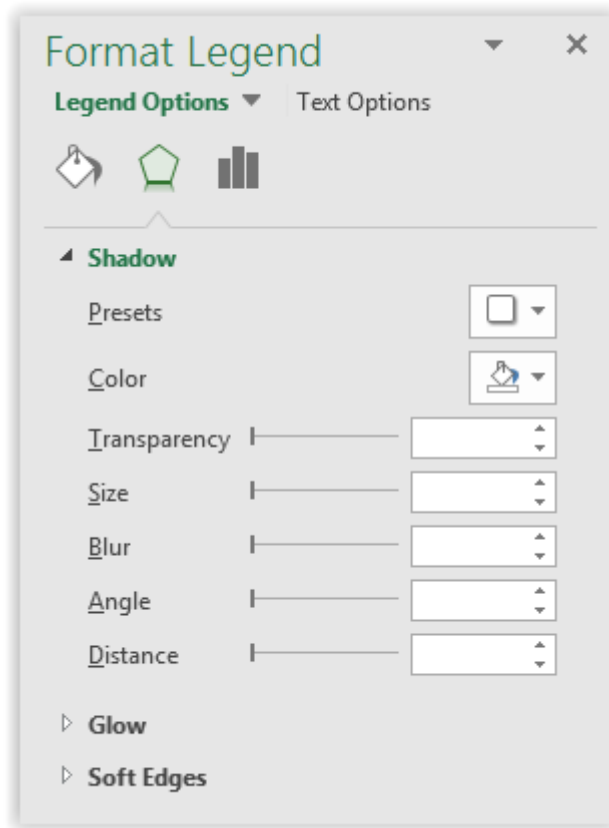
Border   Help visually separate the legend from the rest of the chart with these options:

| **Shadow** | Apply 3D shading effects with these options. This might help make a 3D chart look even more vibrant: |

| **Glow and Soft Edges** | Further enhance the look of your legend by giving it a glowing border. This would be useful if your chart had a dark background: |
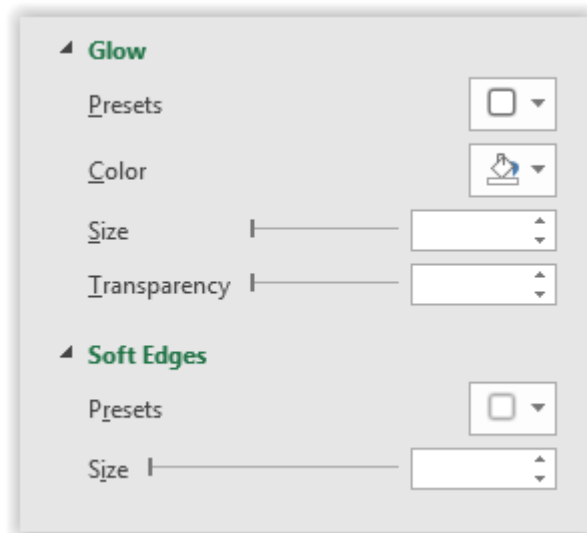
Try right-clicking the different objects in the chart. For example, if you right-click one of the exploded pie slices, you can modify how this and the other slices will look. You can also right-click the area just beside the visual chart components (this is the plot area) and change a number of settings, including 3D formats and rotation.

Finally, if you right-click the blank white area of the chart (around the sales heading and legend) and then select Format Chart Area from the pop-up menu, you will display the Format Chart Area dialog box. This box offers the same sort of formatting commands available by right-clicking other objects.

First, let's take a look at the commands available here:
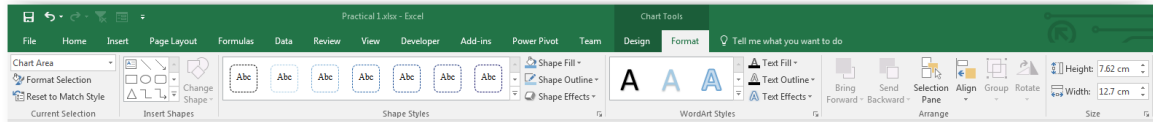
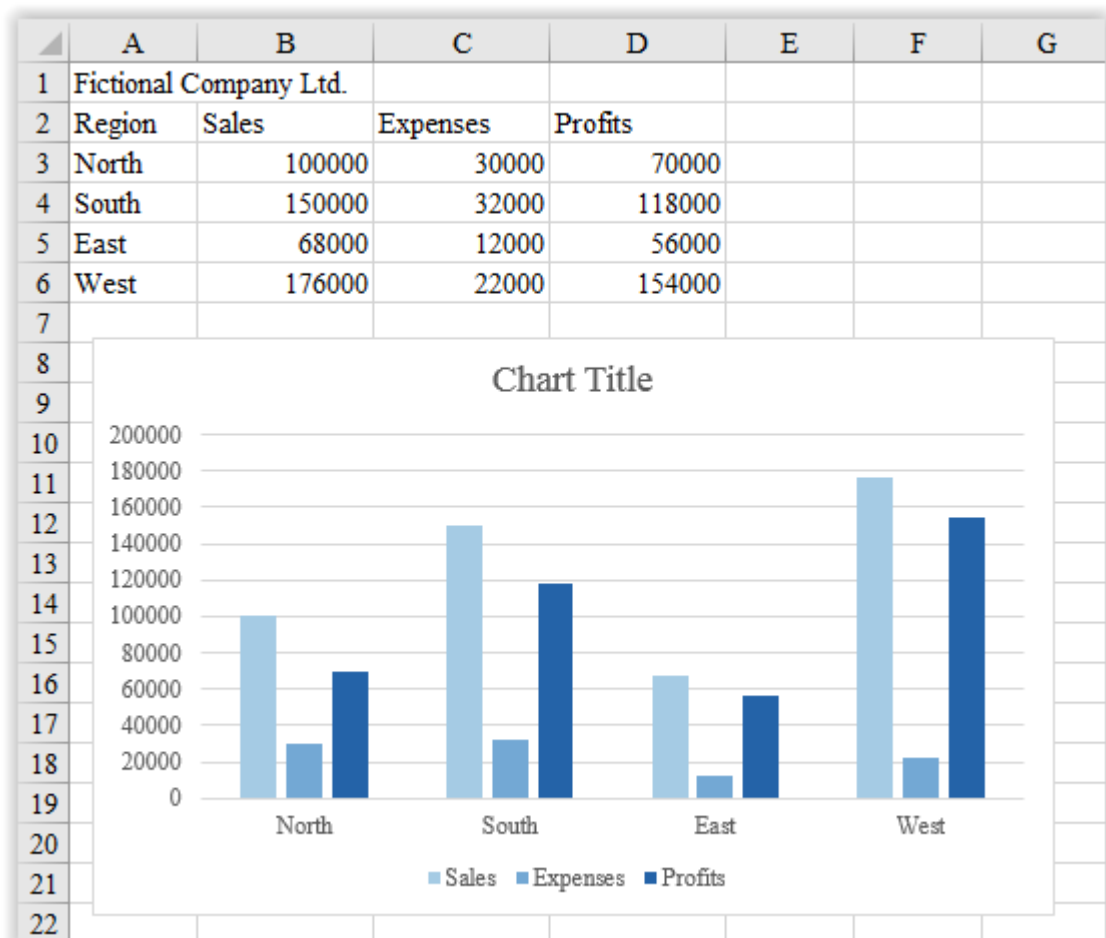To see how these tools work, take the following Excel chart as an example.


3   Additional Styling with the Format Tab

There are a few more styling commands available in the Chart Tools – Format tab:

Click the chart to select it, and then click the **Chart Tools - Format Tab**. Let's go over the groups in this tab:

Current Selection

We saw earlier that you can click the various elements in a chart to select them. If you click the combo box in this group, you can be specific and pick from all the various chart elements. You can then click **Format Selection** to open the appropriate dialog box for the selection, or click **Reset to Match Style** in order to keep all chart elements consistent:
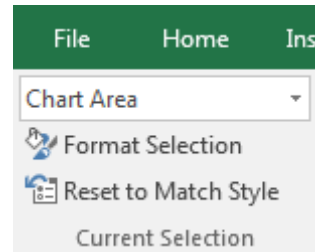

Insert Shapes

Use these commands to insert a shape from a wide range of shapes *(to highlight important data)*
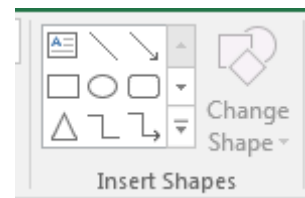
Shape Styles

You can use the controls in the Shape styles group to change the appearance of any objects that you currently have selected in the chart. Select the object that you wish to alter and pick from one of the shape styles. You can also use the **Shape fill, Shape outline and Shape Effects** menus to make more detailed changes
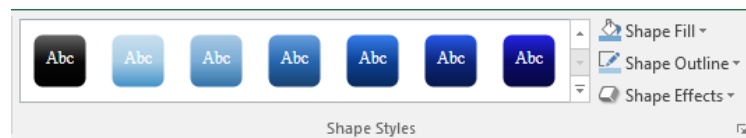
WordArt Styles

WordArt is a type of stylized text that is great for titles or headings. Choose from a number of stylish and textured text effects using the pull-down arrow beside the styles. You can also select the font and outline color and add additional text effects:
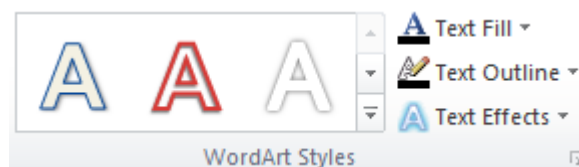
Click the option button to open the **Format Text Effects** dialog box. As you might have guessed, this dialog gives you finer control over the color, fill, style, etc. relating to the WordArt.

Arrange

The Arrange group lets you work with the physical objects in the chart area. Use these commands to decide how objects in the chart will be positioned.

If objects overlap, you can decide which is on top of the other using the Bring Forward/Send Backward commands. The Selection Pane lets you select which object to work with in a worksheet (like multiple charts). Line items in the chart up with the Align command. You can Group several objects together as one, making them easier to work. Finally, you can Rotate objects in the chart if you need to.
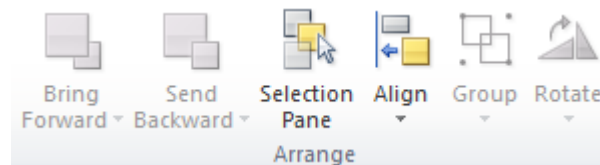
Size

Adjust the width/height of the current chart or chart object using these commands:
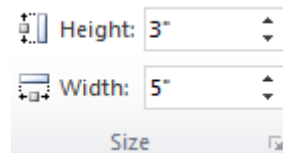
Click the option button to open the Format Chart Area dialog box to the Size tab. As you have probably guessed, there are more detailed size commands available here including scaling and reset tools.

b) Adding a shape

1   Click on the shapes gallery
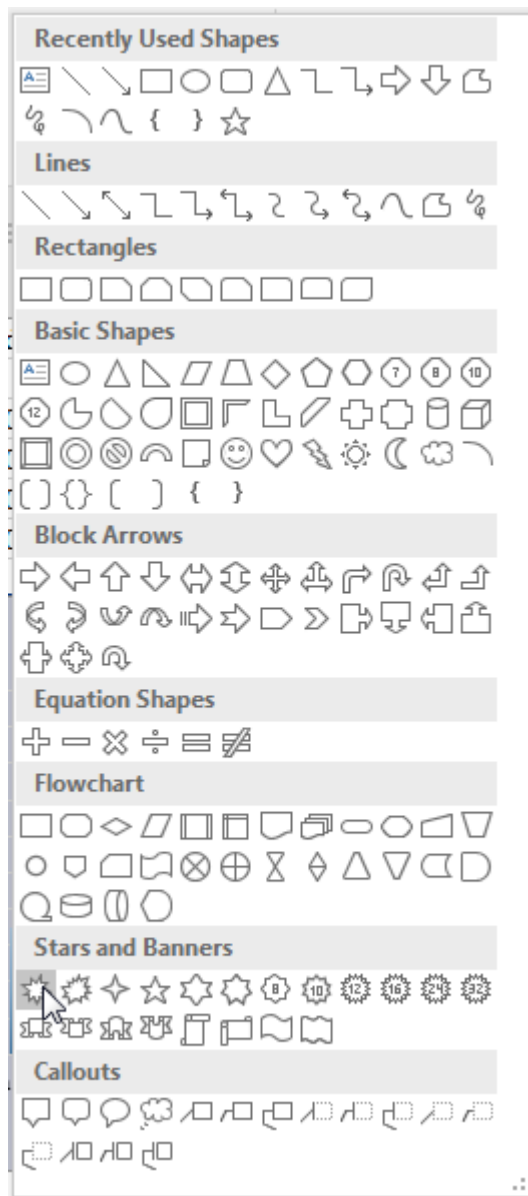
2   Once the shape is selected, click and drag in the chart to place the shape:

Sales 2009
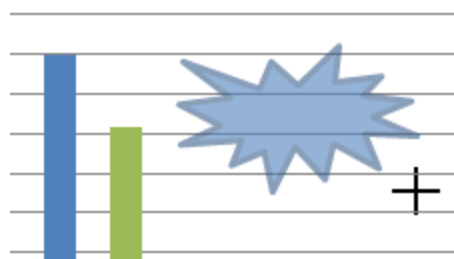
3   The new shape opens another contextual tab, **Drawing Tools → Format**. This tab appears whenever you have inserted a shape or drawing.

4   With the shape selected, type "**Record!**" to celebrate the sales:

5   Click on a chart item again to bring back the **Chart Tools** contextual tabs.

6   Finally, let's add some error bars to see the standard error for this chart:

7   Depending on the element you add from the Layout tab, the chart will automatically adjust itself in order to make everything fit within the boundaries of the chart:
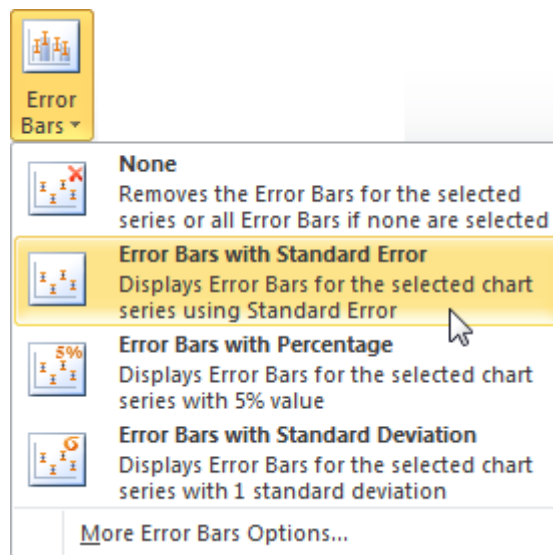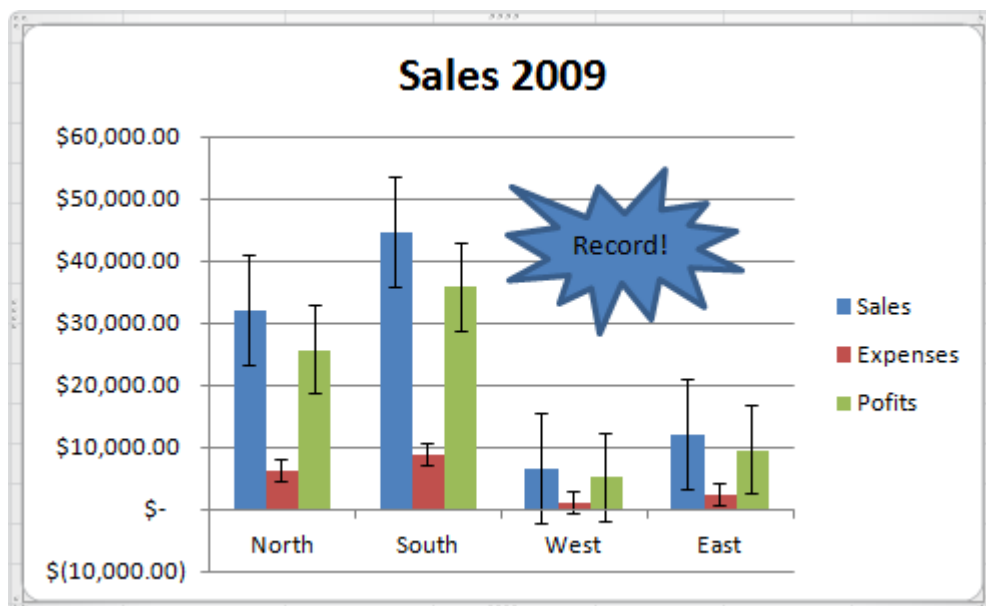

As you can see, it is very easy to add additional information and labelling to your charts. However, there is such a thing as too much information! Don't load up your chart with so much detail that people won't be able to read it. If you do need to add a lot of extra detail, we suggest you make additional charts based on the same data, and then add groups of like chart enhancements together. **Lastly, don't forget about the Undo command!** If the chart element you have added is wrong or doesn't make sense, just undo the action and try something else.

4   Manipulating a Chart

The chart is surrounded by a border. If you move to the edge of a chart border, your cursor will turn into a four-headed arrow. Click and drag an **edge** to physically move the chart around the worksheet. Click and drag a **corner** to make the chart larger or smaller:
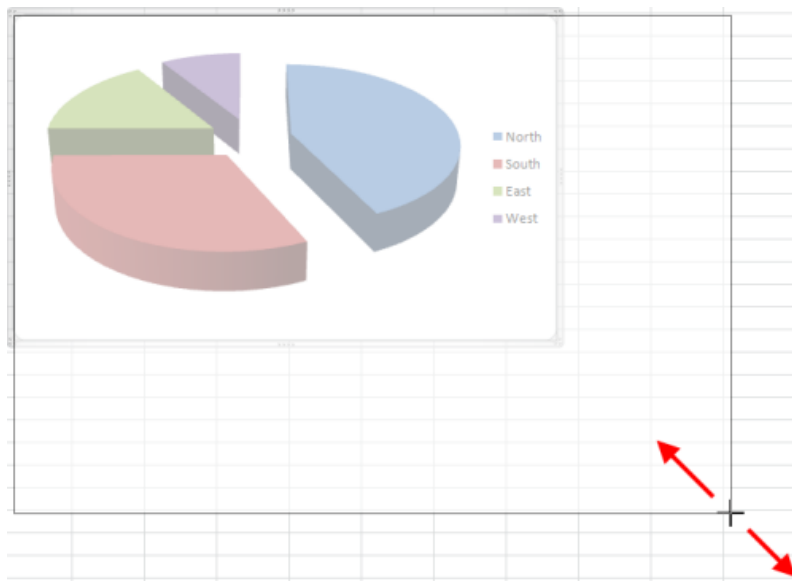
You can also click on individual elements within the chart, such as individual elements of the chart itself or the legend. For example, you can click and drag individual elements of an exploded pie chart and drag them towards or away from the collective centre of the chart:
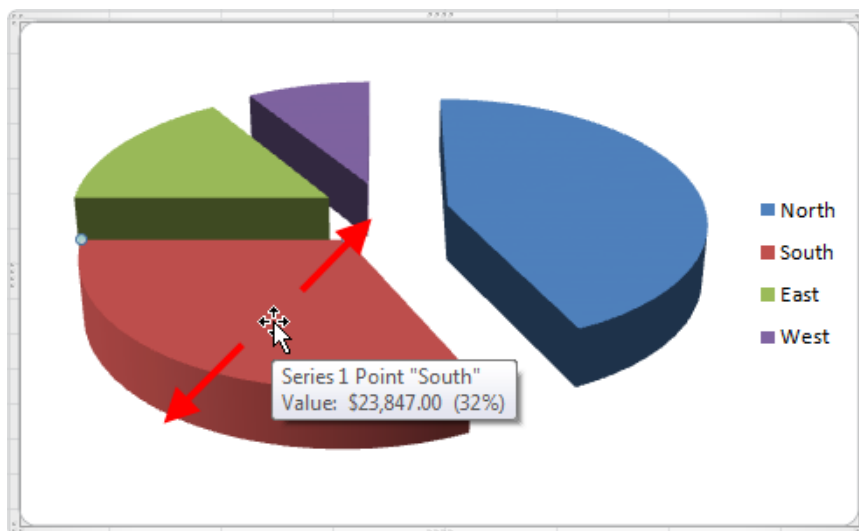
If you want to make a chart an object in another worksheet or move the chart to a sheet of its own, click **Chart Tools - Design → Move Chart**. You can also right-click the **chart →** **Move Chart**:
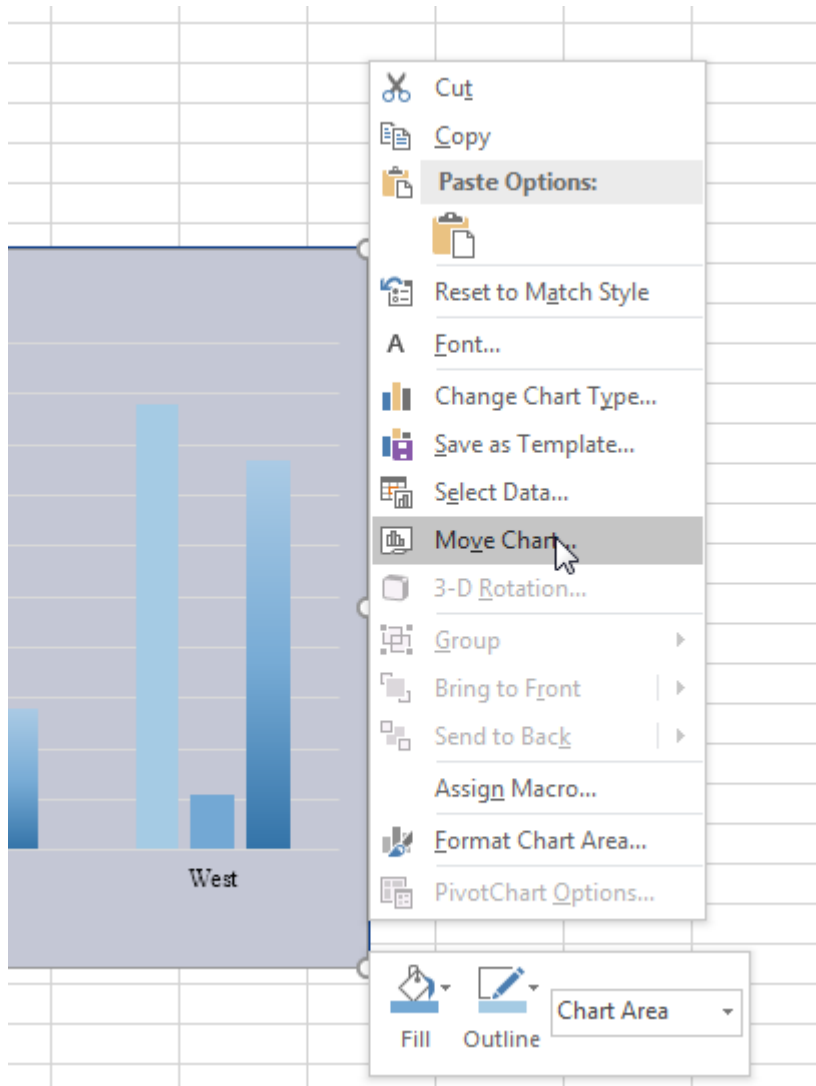
This will display the Move Chart dialog box.
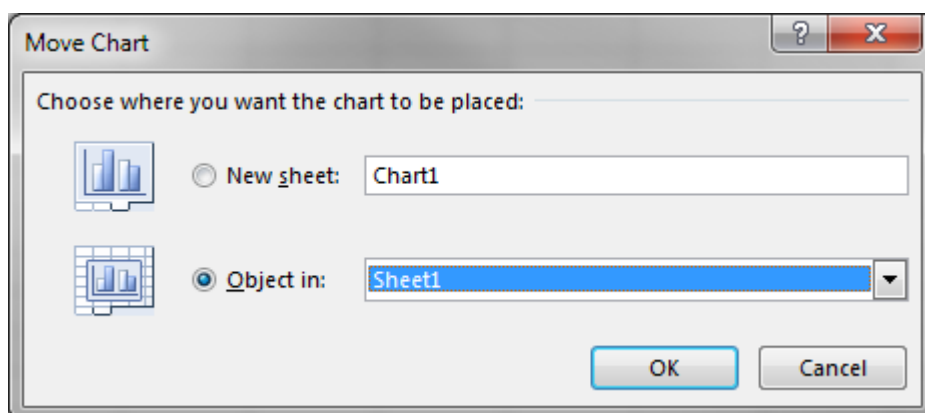
If you click **New sheet**, give the chart another name if you like and click OK. This will move the chart to a sheet all by itself, identified by the worksheet tabs:
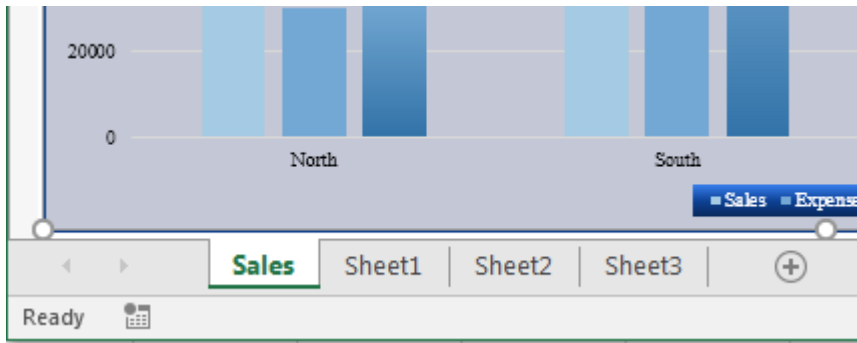
If you click **Object in**, select a worksheet and click OK. A copy of the chart will be embedded as an object into the worksheet.

Finally, to remove a chart from your worksheet, click in the chart area, and press the **Backspace** or **Delete** key on your keyboard.

5   Changing the Type of Chart

1   To change the chart type, click the chart and then click **Chart Tools – Design → Change Chart Type**.
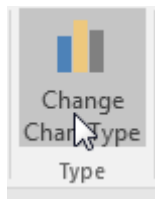
This will display the Change Chart Type dialog box and highlight the current chart type:
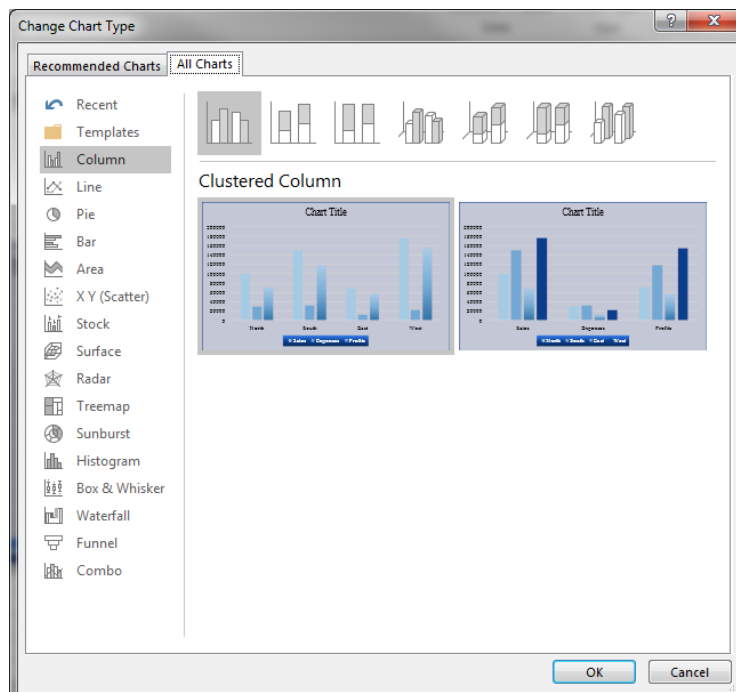
2 With this box, you can select a new chart type from the list on the left and then choose a chart style.

3 Click OK to continue:
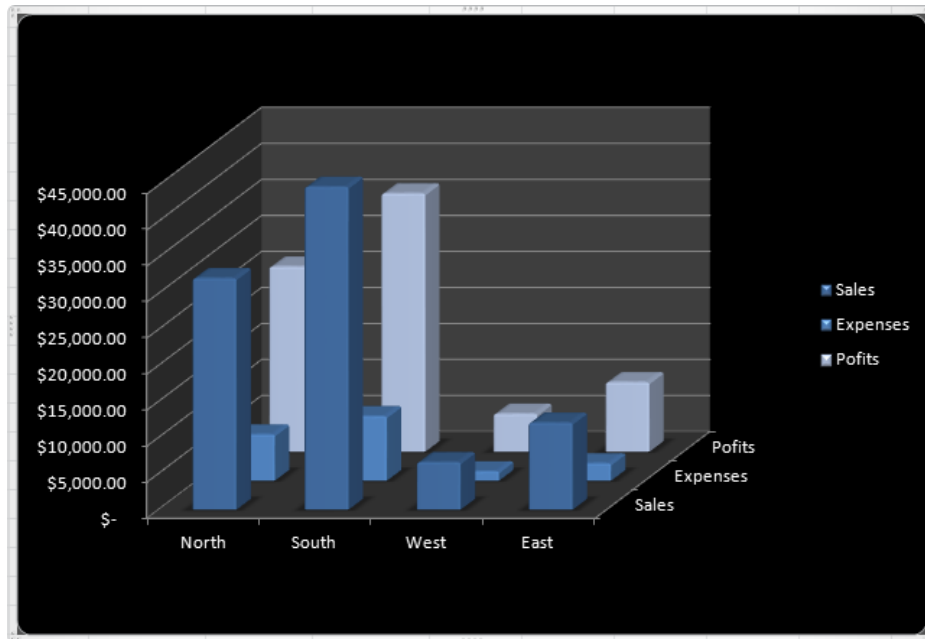
Additional commands in this dialog include the ability to manage chart templates *(which we will discuss in a moment)* and choosing to make a certain chart type the default.

Note that not all chart types will do justice to your data. In fact, some chart types just won't make any sense at all! You may need to experiment with some different chart formats in order to find one that works for your data. Remember that changing the chart type does not affect the source data, so feel free to switch chart types until you get it right.

6 Changing the Source Data

As we have just seen, Excel makes it easy to change the chart type for your data set. Excel also makes it easy to change the source data for your chart while retaining the original chart type.

In the example below, the pie chart is based on sales data per region:

Fictional Company Ltd.			
Region	Sales	Expenses	Profits
North	100000	30000	70000
South	150000	32000	118000
East	68000	12000	56000
West	176000	22000	154000
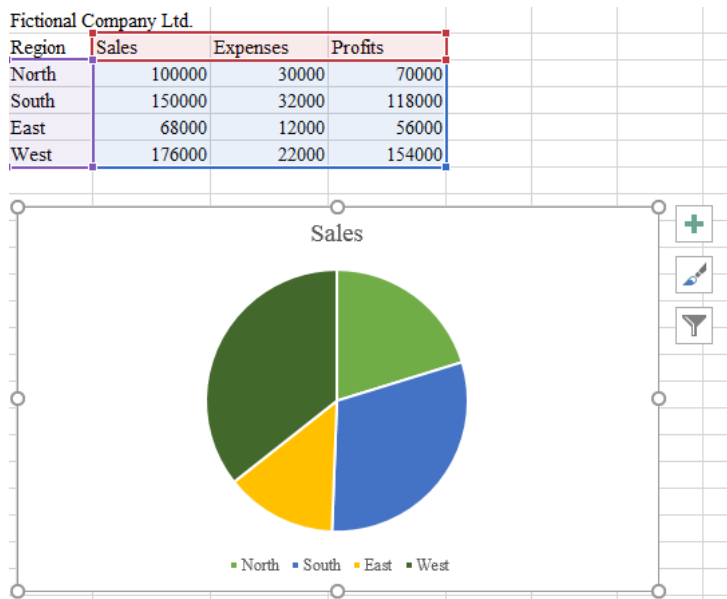
If you wanted to depict expenses per region, you would have to change the source data of the chart from the sales data (B2:B5), to the expenses data (D2:D5).

To do this,

1   **right-click** the chart

2   click **Select Data**:
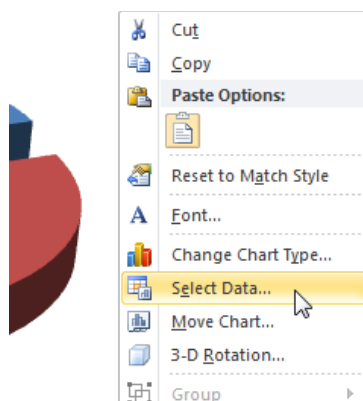
This will display the Select Data Source dialog box:
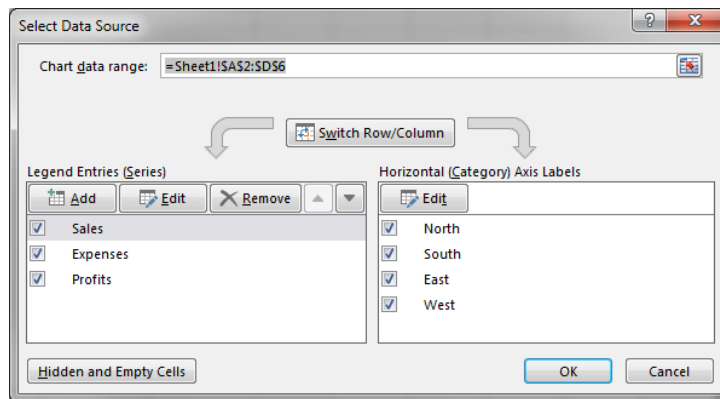
At the top of the dialog box, the Chart data range field shows the range of cells that serve as the current chart data: cells A1:D5. *(As you can see, the range includes dollar signs. We will explore what these dollar signs mean later; for now, just ignore them.)*

3   To change the data source, use your mouse to select the new data range from the spreadsheet *(D2:D6)*.

You will see the new range entered into the Chart data range field. The chart itself will also change:
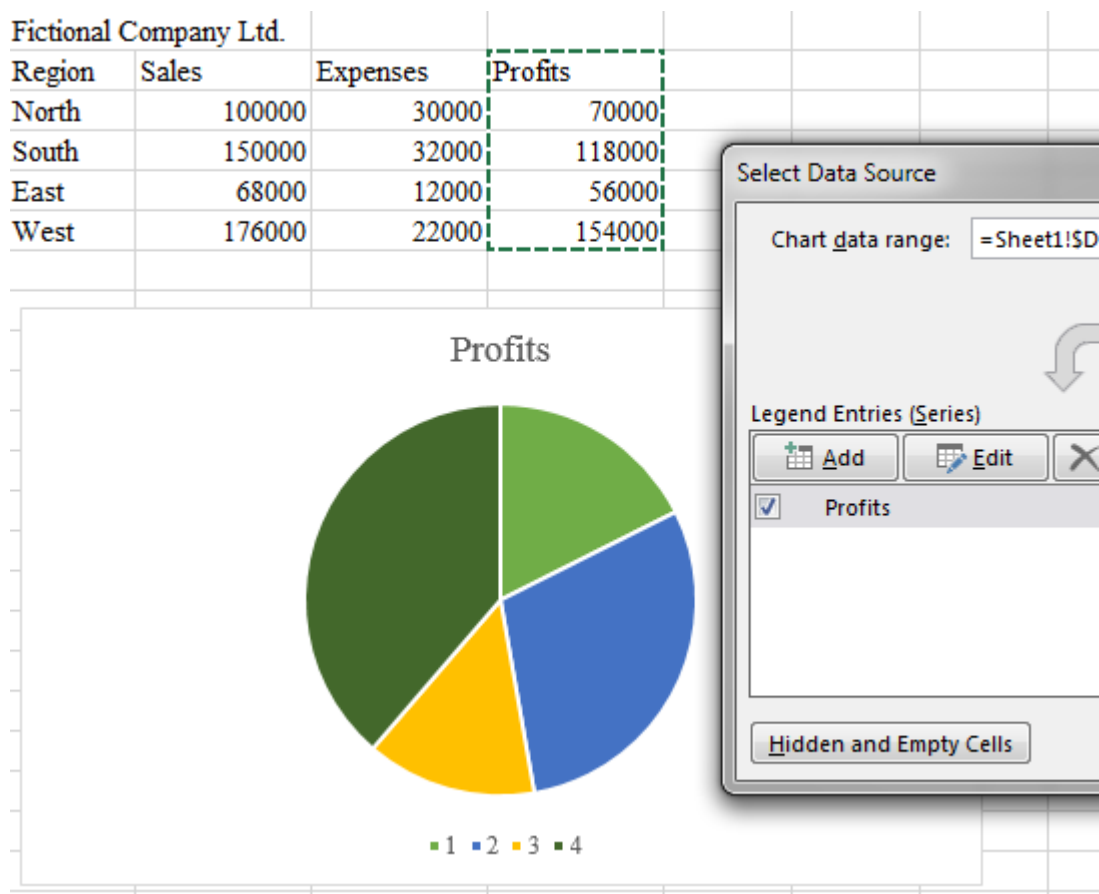
If you added custom elements such as a chart title, you may have to change the title if you changed the source data. Otherwise, Excel takes care of all other updates and your chart is ready to go.

7 Working with the Chart Axes and Data Series

In a typical chart, the axes are the **horizontal** and **vertical** scales. Basically, data is charted with respect to its numerical position along the X or Y axis. A series is a group of data *(normally a selection of cells)* that is to be charted against an axis. You can have more than one series represented in a chart to show how the different series *(selections of data)* compare to each other.

a. To add more than one series to a chart,

1   **right-click** on the chart and

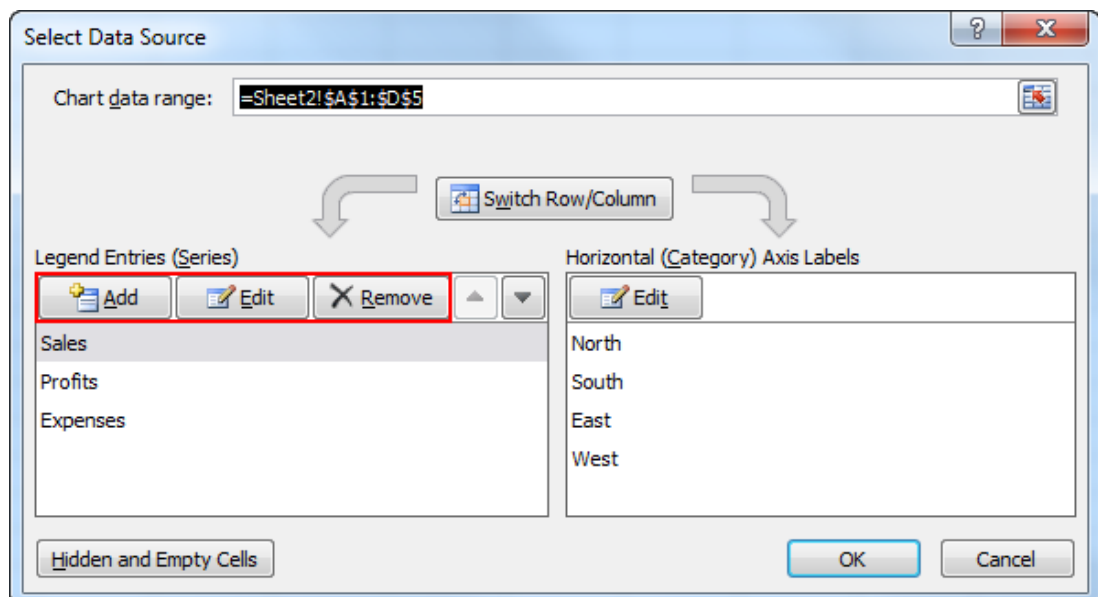2   click **Select Data** from the menu that appears.

3   When the Select Data Source dialog box appears, you will see buttons for adding and removing a series of data:

4   To add a new series to the chart, click the **Add** button. This will display an **Edit Series** box where you can enter a name for the series in the name field that is provided. You can also edit an existing series *(for example, by selecting more or less data)* using the Edit button:
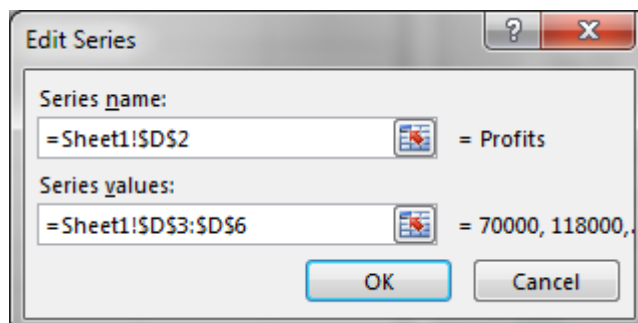
5   If you click the 🔳 button, you will be switched back the worksheet where you can select a range by clicking and dragging your mouse pointer. *(You can also enter a data series by typing a range directly into the text fields, but selecting with the mouse is usually simpler.)*

In the following stacked line chart, the Sales data and Profit data are represented against a Y axis consisting of dollar amounts.

6   To control the chart axes, **right-click** on one of the amounts on the Y axis and click **Format Axis**:
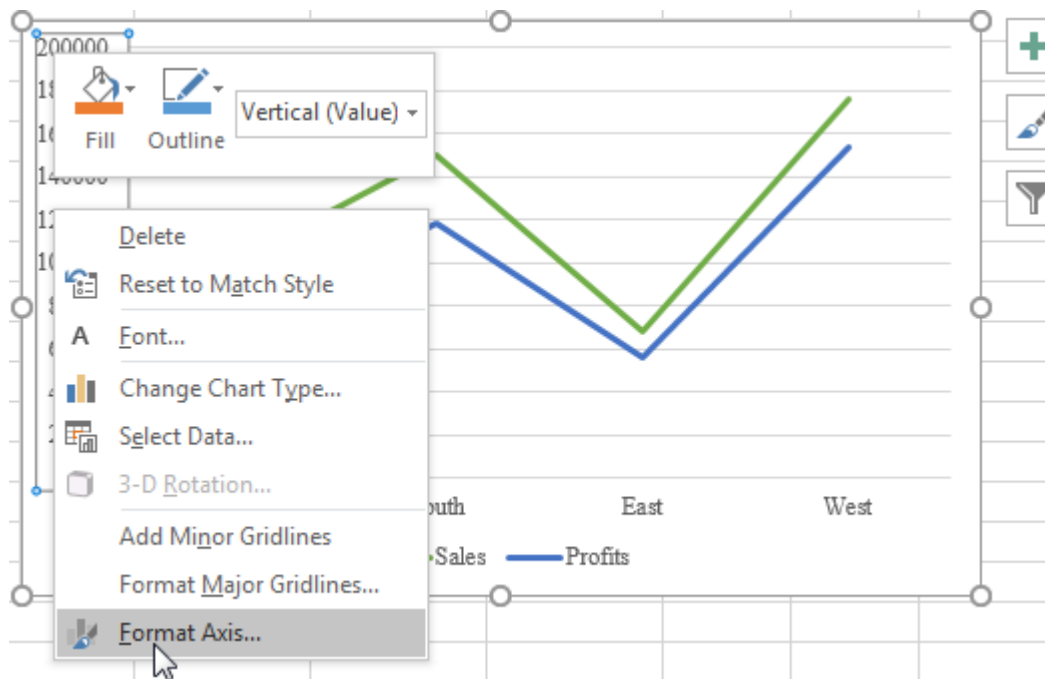
This will display a **Format Axis** task pane
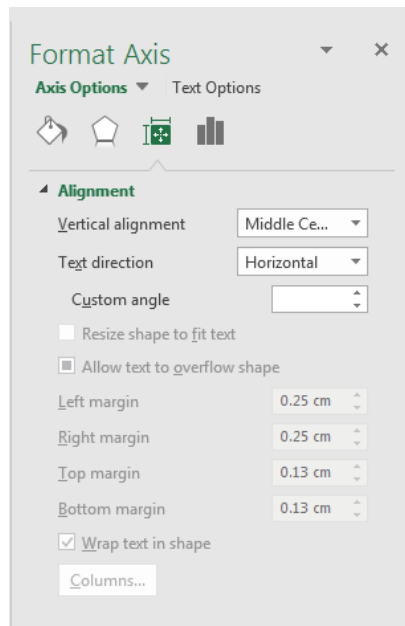
7   Click on the chart icon
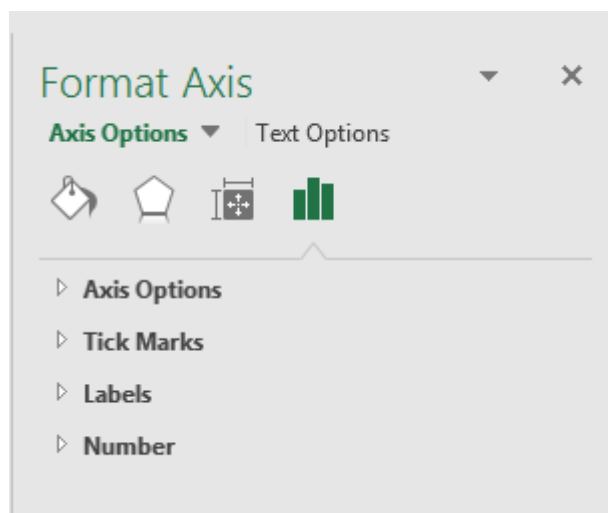
8   Use any of the other heading in the task pane to modify the look and feel of the axis'
      components.

b.   Changing the labelling

Usually, the more information Excel has to create your chart, the better. If all of your
source data is appropriately labelled, and you select those data labels before creating a
chart, chances are the chart will be correctly labelled. However, if you want to change the
labels on an axis, do the following.

1   First, type the new labels somewhere in your worksheet **in the same order as the
      original labels** *(you'll need them in a moment)*.

2   This means that if the current headings *(North, South, East, West)* were written
      horizontally across four columns, type the new headings *(A, B, C, D)* horizontally
      across four columns somewhere else in the worksheet.

3   Next open the **Select Data Source** dialog box and click the **Edit** button under the **Horizontal** *(Category)* **Axis Labels** heading:
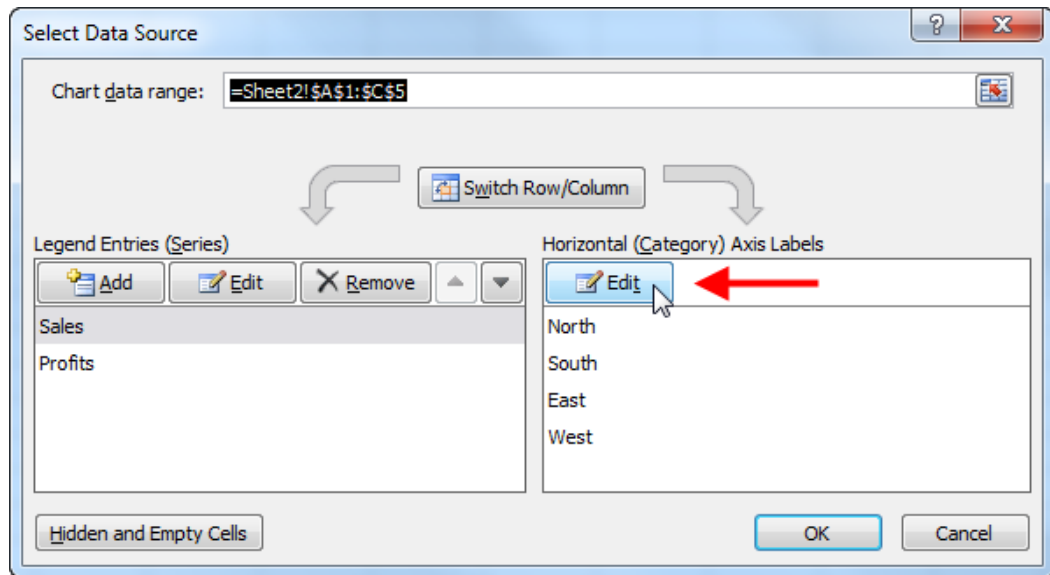
4   The **Axis Labels** dialog box will appear and let you select the labels you want from the worksheet.

5   Click and drag your mouse to select the appropriate cells, or manually type the cell range into the box provided:
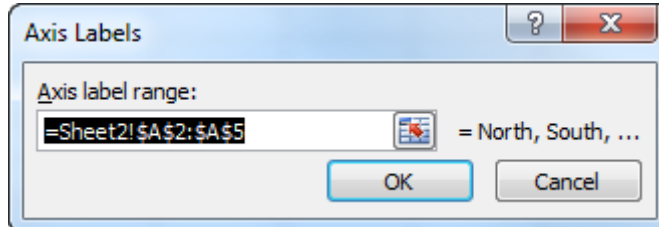
8   Saving a Chart as a Template

If you have spent a lot of time getting your chart just right, you might want to save the chart settings as a template. This will allow you to create another chart with the same formatting in just a few clicks, rather than spending a lot of time doing the same formatting over and over again. Templates allow you to save the chart type, colours, and formatting.

Consider the following chart style and layout that we want to save as a template:
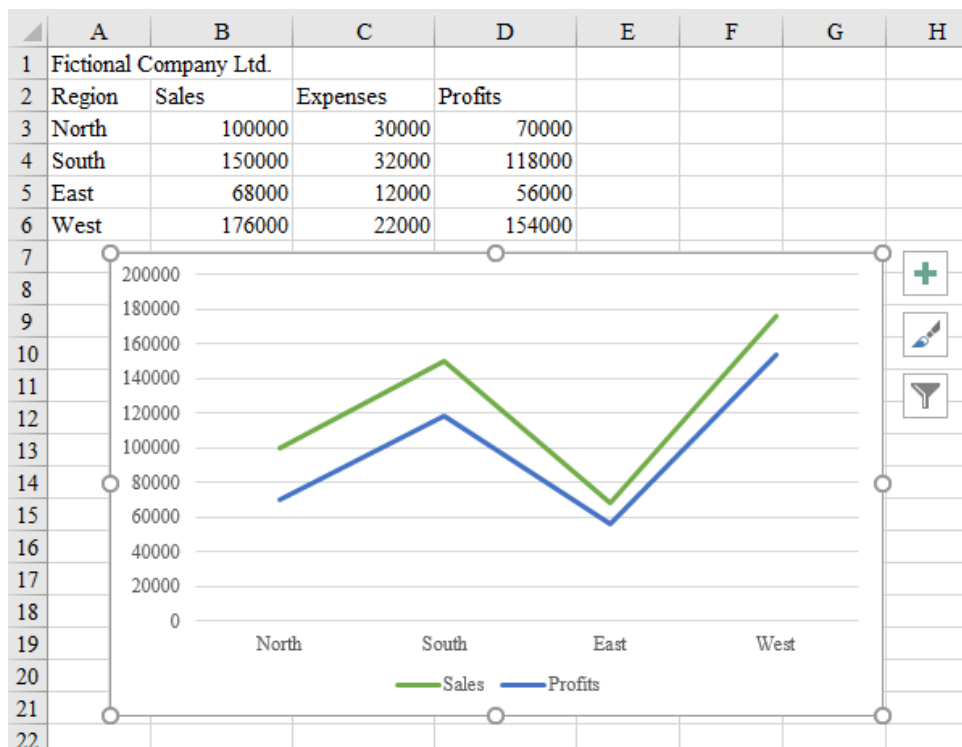
To save this chart as a template,

1   right click the chart and click **Save As Template**:

2   When the **Save Chart Template** dialog appears, choose a save location *(the default template location is highlighted)*, give the template a name, and then click **Save**:
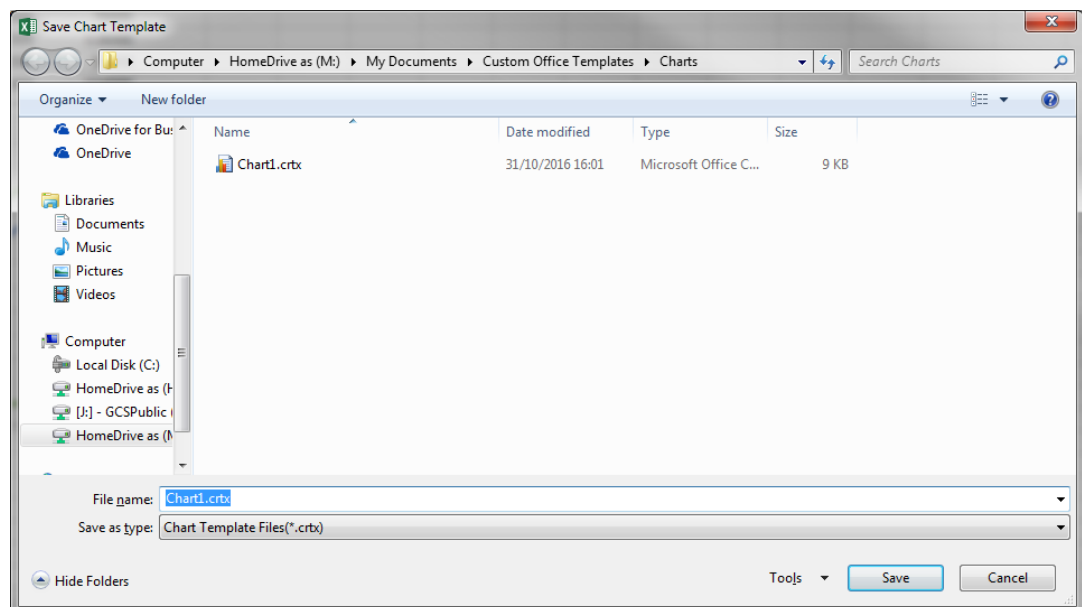
3   When you want to use the template, select some data,

4   Click the **Insert tab**

5   In the Charts group click **See all Charts**
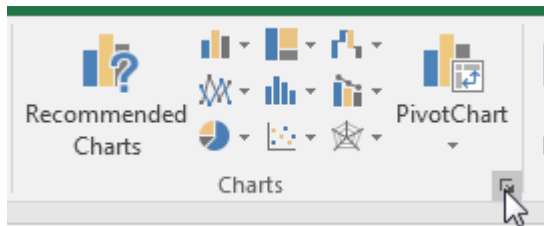
6   When the **Create Chart** dialog appears, click the **Templates** option at the top of the list on the left and select your template.

You can hover over each template for a moment to see which is which:
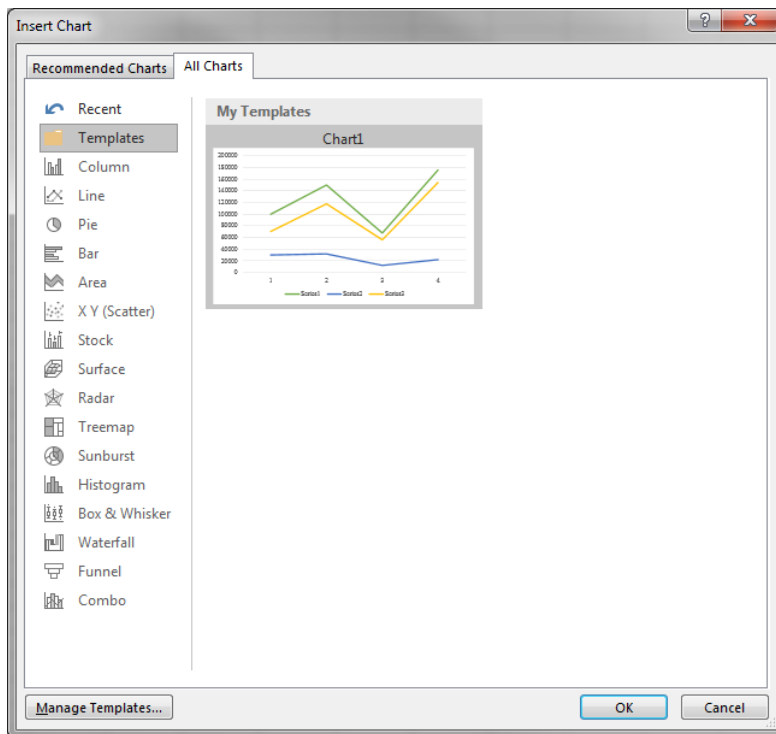
Experiment with different charts and see what works best for you.

However, keep in mind that the pre-set chart styles in Excel were very thoughtfully designed and implemented. It may be difficult to surpass this new, quick, and easy method of formatting charts.

Exercises

1   Exercise: Creating a Chart

In this exercise you will create and modify a simple chart.

1   Open Lesson Practical 1 from your Exercise Folder:

2   Select all the information in the worksheet **except** the main title *(Fictional Company Ltd)*:

3   Click Insert tab → Column → 2D Clustered Column:
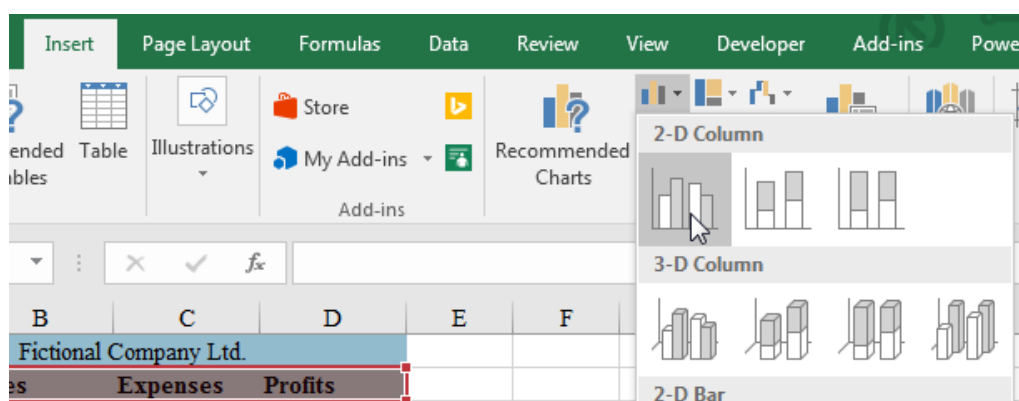
The chart will appear in the worksheet and the **Chart Tools** contextual tabs will be displayed:
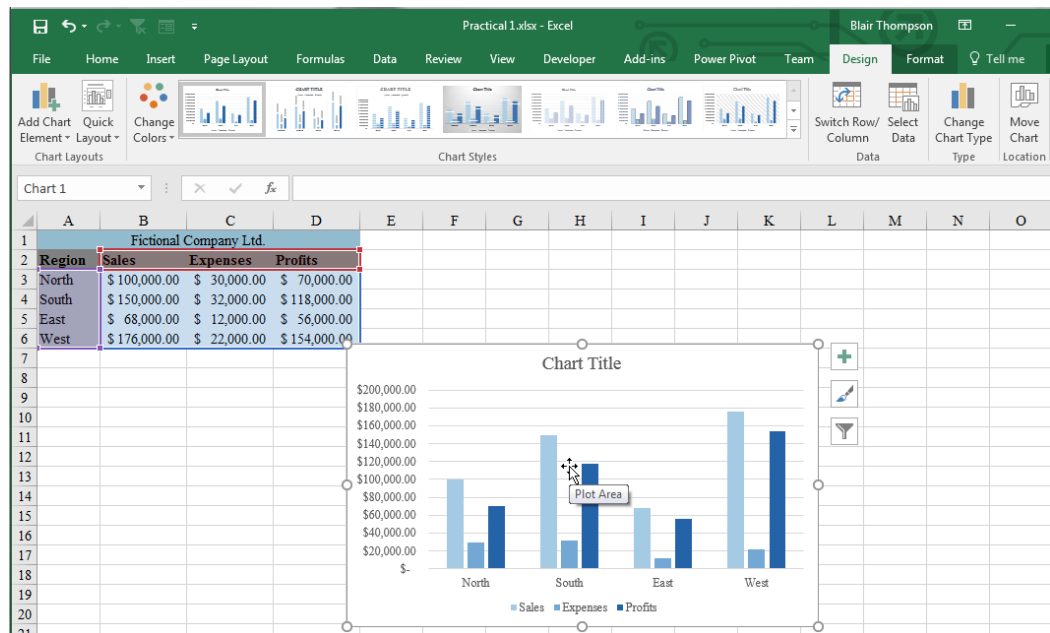
4   Click the drop-down arrow in the Chart Styles group of the Chart Tools → Design tab:
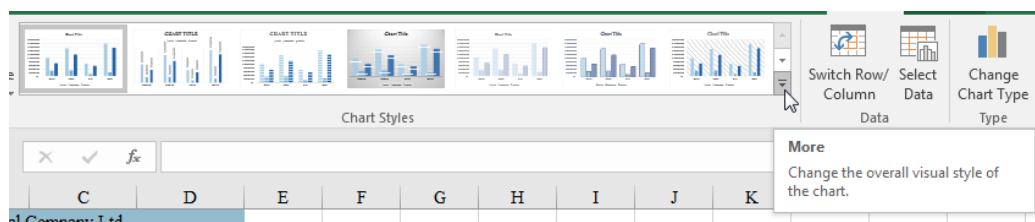
5   This will display a number of chart styles based on the current theme which has been applied to the worksheet. Select any one of the styles:
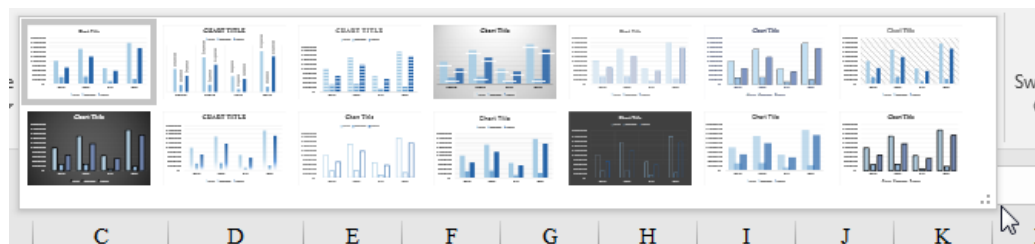
6   **Click** and **drag** the outside edge of the chart to move it under the source data:
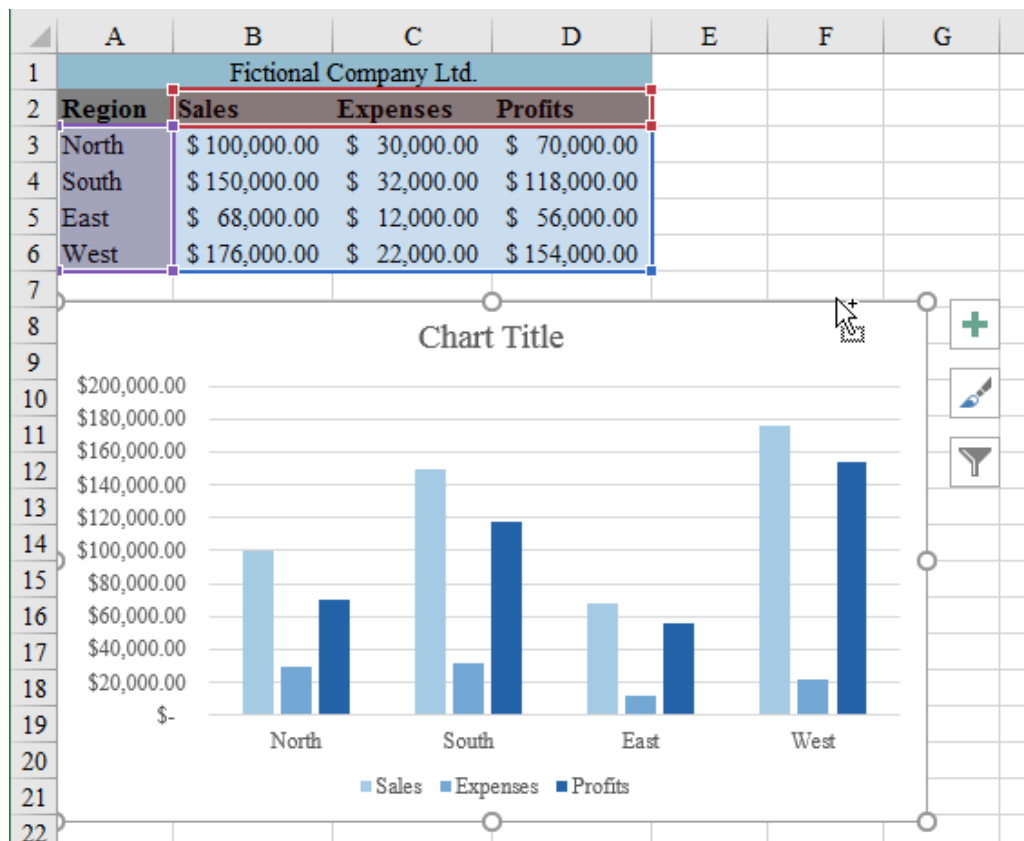
7   Now move your mouse to the bottom right-hand corner of the chart area so your pointer turns into a **double-headed arrow**.

8   Hold the **Shift Key** down and then **click and drag** to make the chart area small enough to fit under the source data:
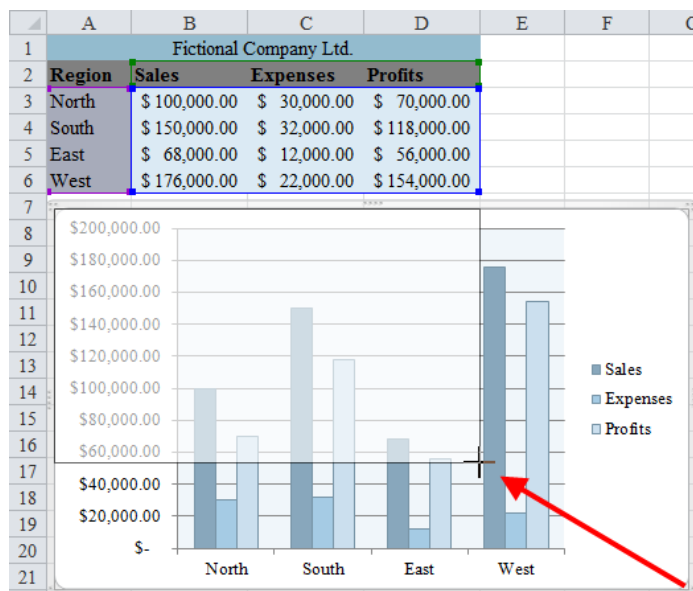
Note that holding the Shift key allows you to resize a chart while maintaining the chart's width/height ratio. You may need to move the chart when you have finished resizing it.

9   Your worksheet should now look something like this:

	A	B	C	D	E
1	Fictional Company Ltd.				
2	**Region**	**Sales**	**Expenses**	**Profits**	
3	North	$ 100,000.00	$ 30,000.00	$ 70,000.00	
4	South	$ 150,000.00	$ 32,000.00	$ 118,000.00	
5	East	$ 68,000.00	$ 12,000.00	$ 56,000.00	
6	West	$ 176,000.00	$ 22,000.00	$ 154,000.00	
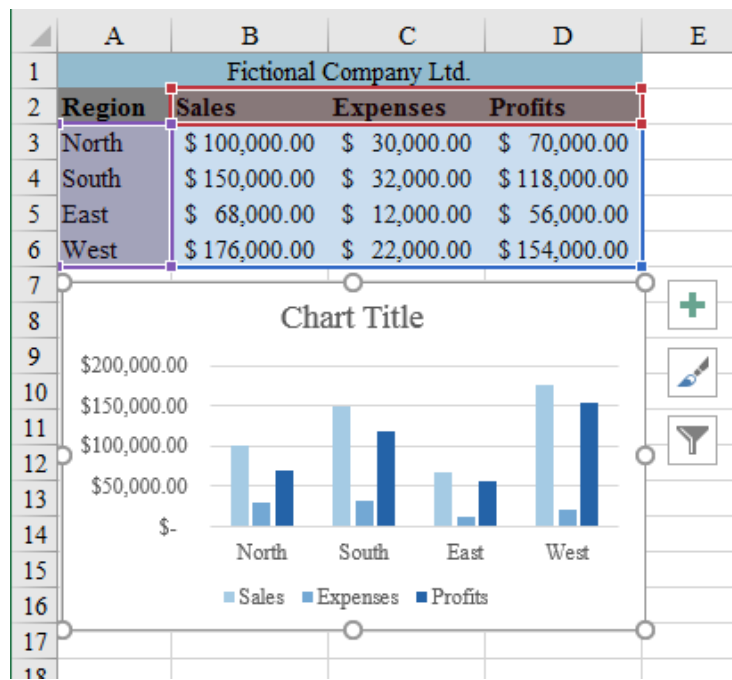
10   **Save the file** to your own folder to complete this lesson.

2 Exercise: Changing the Source Data

In this exercise, you will alter the source data for a chart.

1 Open **Practical 2** from your Exercise Folder:

2 Right-click the black chart area and click Select Data:
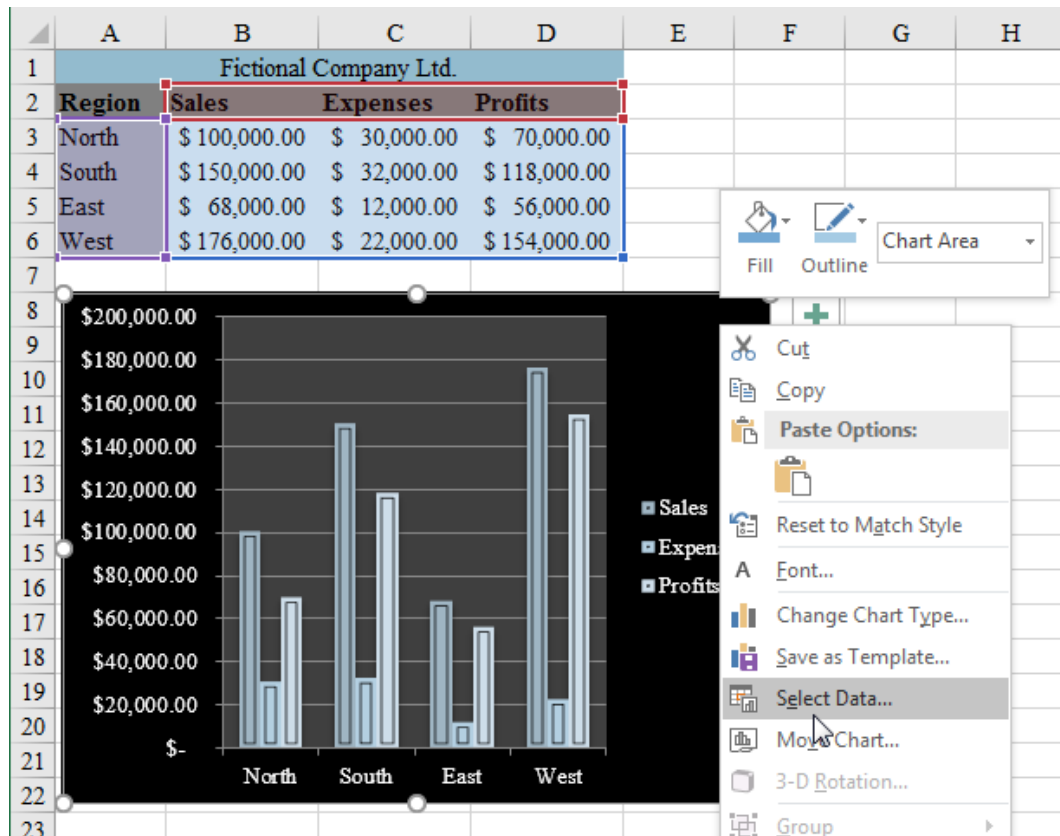
3 The Select Data Source dialog box will appear. This shows you what data has been used to create the chart. Click the Switch Row/Column button:
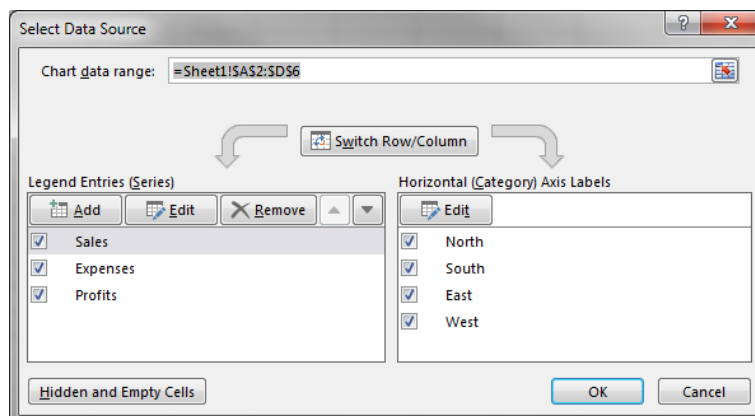
4 Click **OK**. You will see how the chart looks different when you change the way in which the data is presented:
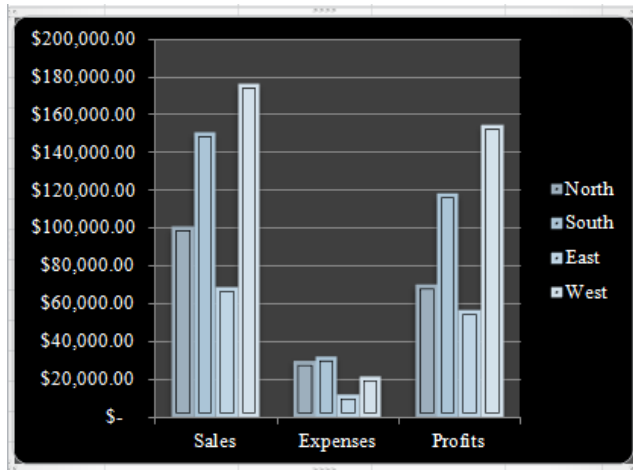
5   Right-click the black chart area and click Select Data again. With the dialog open, select only the Region and Sales columns *(A2:B6)*. Once you select the data, the chart will automatically update in the background:
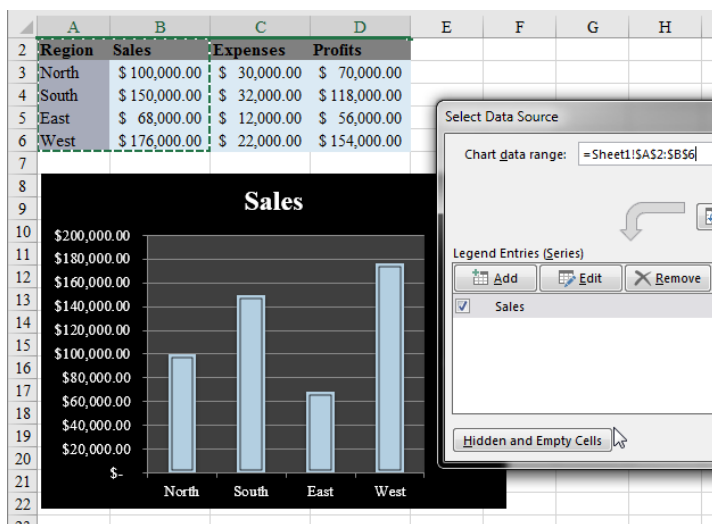
6   Click **OK** to apply these changes. Change **B5** to **175000** and **B6** to **50000**. The chart will automatically update to reflect any new changes in the data:

7   **Right-click** the black chart area once more and click **Select Data**. This time, use cells **A2:C6** for the chart:
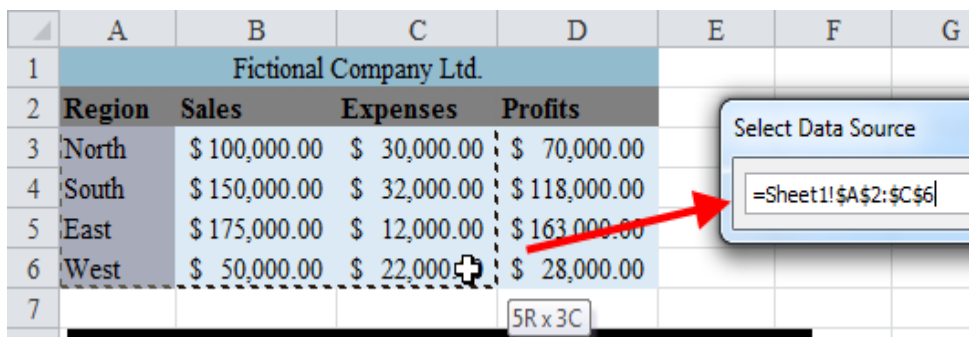
8   Click **OK** to close the dialog. Your worksheet should now look something like this:

	A	B	C	D	E
1	Fictional Company Ltd.				
2	Region	Sales	Expenses	Profits	
3	North	$ 100,000.00	$ 30,000.00	$ 70,000.00	
4	South	$ 150,000.00	$ 32,000.00	$ 118,000.00	
5	East	$ 175,000.00	$ 12,000.00	$ 163,000.00	
6	West	$ 50,000.00	$ 22,000.00	$ 28,000.00	
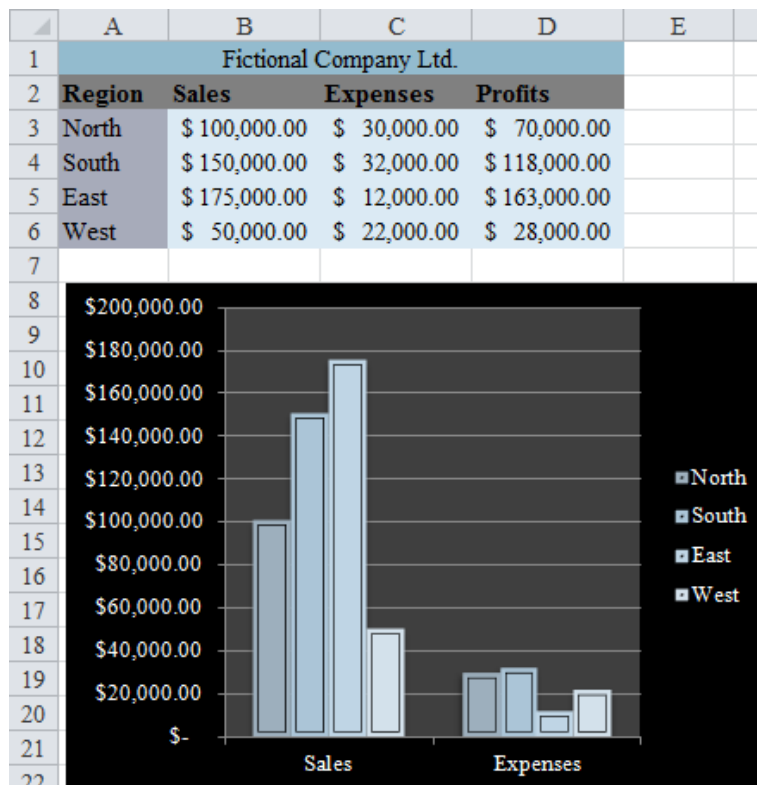
9   **Save** the file back to your work folder to complete this exercise.

3 Exercise: Add elements to the chart

Open **Practical 3** from your work folder and follow the instructions below;

1   Create a **3D Clustered Column** chart with the data range **A5:F11** (Includes item titles and column heading information with the data.)

2   Add the Chart Title; **Year 2011 Stock Levels** above the chart. (if there is no text box there use the **Add Chart Element** tool first)

3   Put in a **vertical** title of **Item Units**, from the **Axis Titles, Primary Vertical axis** option.

4   Show the **Legend** on Top of the chart.

5   Keep this chart as an **embedded chart** within the same worksheet.

6   **Drag** the chart so that it sits directly underneath the worksheet data.

7   **Re-save** the workbook.

4 Exercise: Alter the appearance of a chart

Open **Practical 4.xlsx** from your work folder and follow the instructions below;

1   Create a **3-D Pie Chart** from the data in columns **A** and **B** only.

2   From the **Layout tab**, edit the **Chart Title** to show **Scottish Parliament Seats – Forecast** above the chart

3   Show the Legend for this chart **to the left**.

4   Choose **Outside End** from the **Data Labels** options

5   From the **More Data Labels Options**… make this show a **percentage**

6   From the **Design Tab**, save this in a **New Sheet** with the name **MSP Chart**.

7   **Move** this chart to after **Sheet 1**.

8   **Re-save** the spreadsheet.

5   Exercise: Create and format a graph

1   Open the **Practical 5.xlsx** file

2   Create a **Line Graph with markers** using the data above.

3   Use **Salonika - Average Yearly Temperature**, for the title **above**.

4   In the **Value Y-axis** put in a **rotated title**, **Degrees Celsius**.

5   **Remove** the **Legend** from the graph.

6   Save in a **New Sheet** and name it **Yearly Temperature**.

7   **Move** this chart to **end** of workbook and rename the chart tab **Year Temp**.

8   **Save** and **close** the workbook.

6 Exercise: Format Markers/Move Chart

Open **Practical 6** from your work folder and follow the instructions below;

1   Create an **XY (Scatter) Chart** from the above data in **A4:B9**.

2   Use the option with …**smoothed lines and markers**.

3   From the **Design Tab**, remove the **Legend** and also the **Chart Title**.

4   **Primary Horizontal Axis** *(X)* to be labelled **Time** and **Vertical Axis** *(Y)* **Substance 1**

5   Save the chart in a **New Sheet** called **Substance Report 2011**.

6   **Move** the chart after **Sheet 1** and **delete** sheets **2** and **3**.

7   Select the **Series data curve** and change the **line colour** and **markers styles**.

8   **Right-click** inside the **Plot Area** and choose a **colour, design** or **texture** for this.

9   **Re-save** the spreadsheet to your exercise disk.

7 Exercise: Change Chart type

Open the Excel Workbook created in **Practical 4,** below.
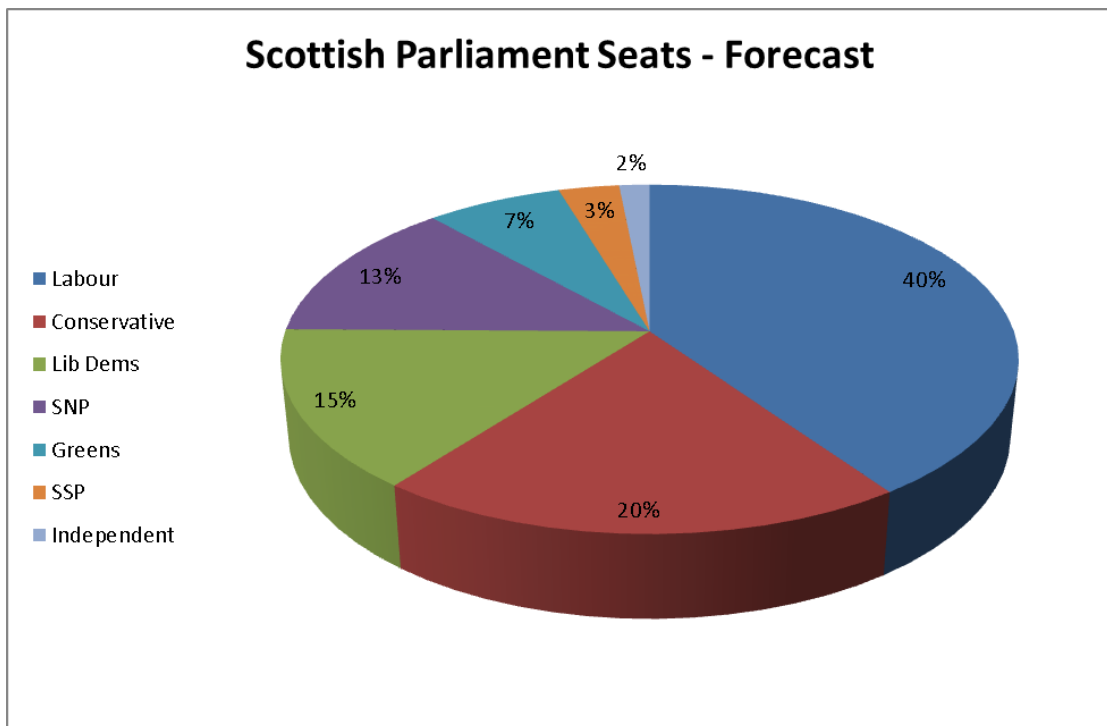
1   Click on the **MSP Chart Tab** and make sure the chart is selected.

2   From the **Design Tab** select the **Change Chart Type** button and choose **Clustered Bar.**

3   Click the **Select Data** button and add the **Actual** column data to the **Select Data Source dialogue box** – so it now shows **=Sheet1!$A$5:$C$12**

4   Click **OK**. The additional column data is now added to the chart

5   Remove the **Data Labels** from the chart.

6   Edit the **Chart Title** to read **Scottish Parliament – number of total seats**.

7   Place the **Legend** at the **Top** of the chart.

8   Finally, show the **Data Table with Legend Keys**, *below* the chart then **re-save** the chart and **save** the workbook as **Practical 7**.

8   Exercise: Adding Shapes and Text

Open the Excel Workbook created in **Practical 5** and select the chart you created.

1   Select the **Plot Area** of the graph and from the **Format Tab**, choose another **colour** or **Gradient**. (Shape Fill)

2   Next, from the **Format tab…Insert Shapes group**, select a **callout** shape and draw an arrow pointing to the highest point in the graph.

3   Add text to the callout reading "Temp High Point"

4   Use the **Drawing Tools Format Tab** to change the **colour** and **border** of the **arrow** and **Text box** created.

5   **Right-click** the **Data Series** line of the graph and click **Format Data Series**

6   Choose new **colours** and **styles** for the **Line** and **Markers**. Using the pane on the right hand side of the screen

7   Once complete, **save** workbook as **Practical 8**

9   Exercise: Trendline and Error Bars

Open the Workbook created in **Practical 6** and select the chart sheet you created.
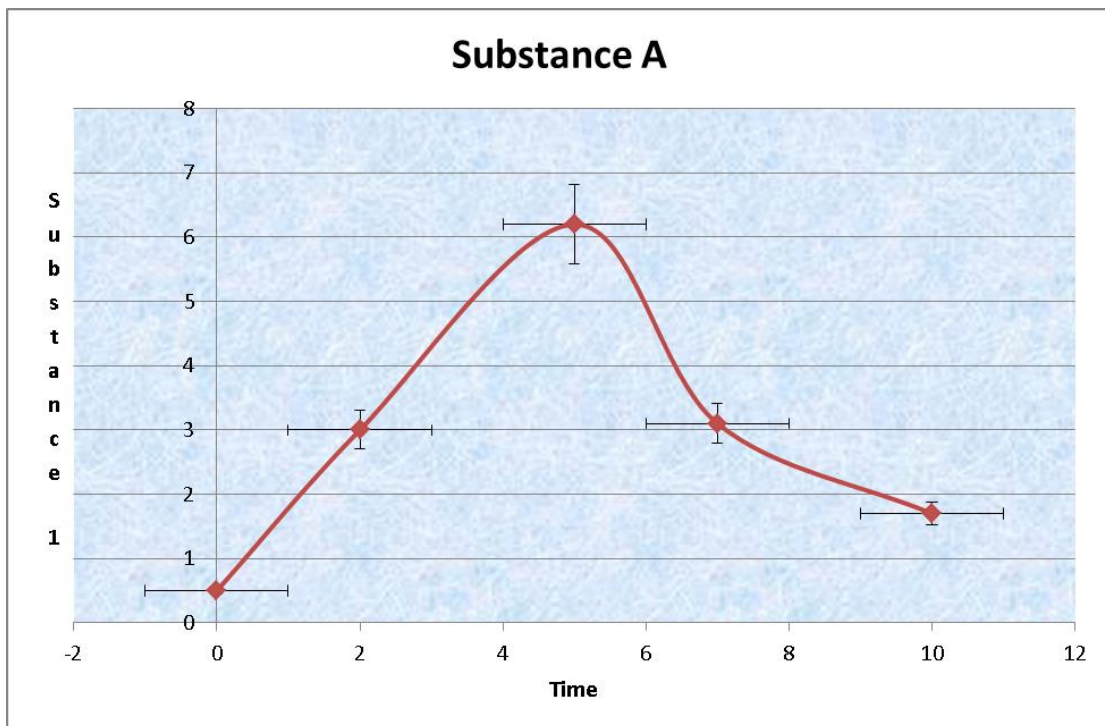
1   Select the Series Line in your chart.

2   From the Design Tab…Add Chart Elements menu, choose More Error Bars Options from the Error Bars sub menu

3   Select the Both option and set a Percentage of 10.0

4   Close the Format Error Bars pane.

     Error Bars can be added to data points to show error ranges in data.

5   Select the Series Line once more.

6   From the **Add Chart Elements**, choose Linear Trendline from the Trendline sub menu.

7   Try changing the Format of the Trendline once in your chart.

8   Finally, re-save the workbook as Practical 9

     Trend lines can be added to produce examples of 'best-fit' lines and curves

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10 Exercise: Custom Error Bars

Open **Practical 10** from your work folder and follow the instructions below;

1   Highlight cells **B3:G5**

2   From the **Insert Tab**, choose **Column…2D Clustered Column chart**

3   From **Add Chart Elements**, choose **Error Bars…More Error Bars Options…**

4   From the **Add Error Bars** dialogue box, choose **men**, and **OK**

5   Ensure the **Direction** is **Both** and **End Style** is **Cap**

6   Select **Custom** from the **Error Amount** section, then click the **Specify Value** button

7   Using the **Collapse Dialogue box**, highlight the cell range **C7:G7** *(men Standard Deviation)* for both the **Positive Error value** and the **Negative Error Value**, then **OK**

8   Repeat the process to show **women standard deviation**.

9   Add **Chart and Axes Titles** as shown.

10   Finally, apply an **APA-type formatting** to the chart as described earlier.

       Your final chart should look similar to the one below.
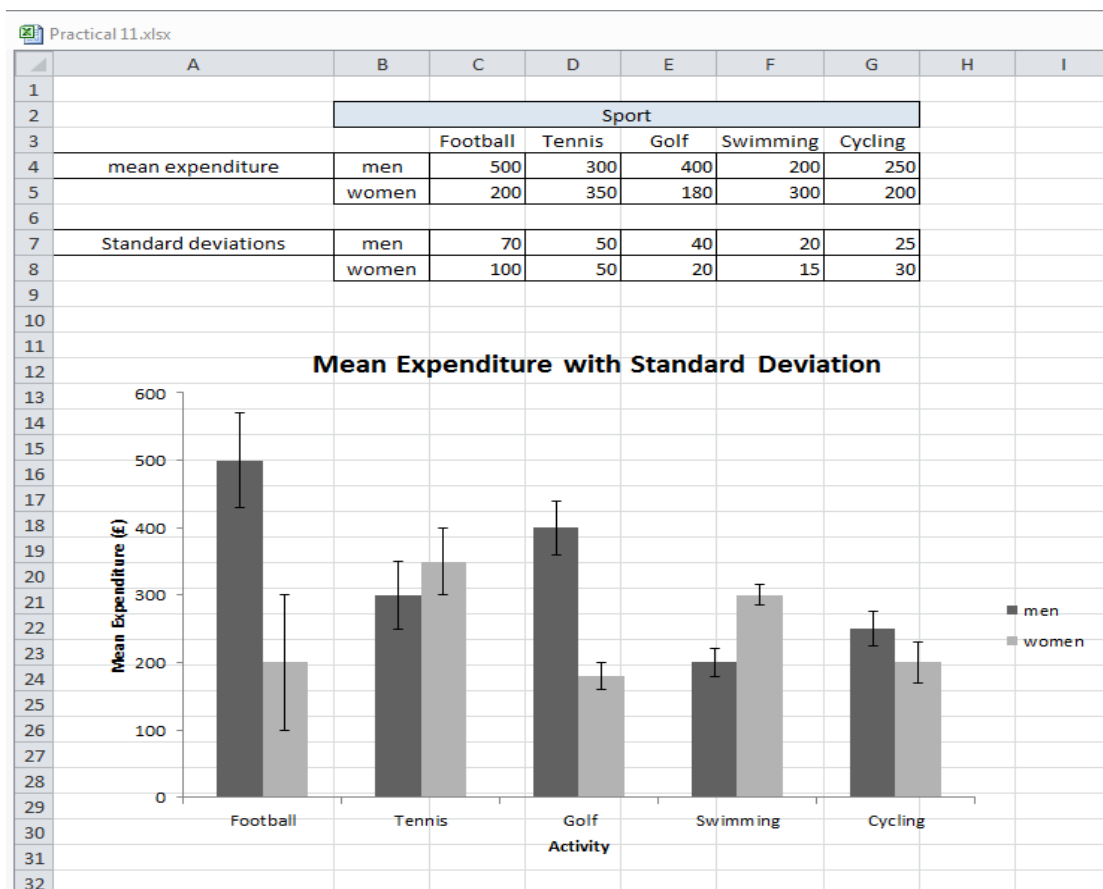
Useful Shortcut keys

Using keyboard shortcuts can help you become more efficient when creating documents in Microsoft applications. Most keyboard shortcuts require you to use two or more keys at the same time. To use a keyboard shortcut first press and hold down the modifier key or keys (i.e. SHIFT, CTRL, ALT) and then press the corresponding standard key on your keyboard.

Function	Shortcut
Go to "Tell me what you want to do"	ALT+Q
Open	CTRL+O
Save	CTRL+S
Close	CTRL+W
Cut	CTRL+X
Copy	CTRL+C
Paste	CTRL+V
Select all	CTRL+A
Bold	CTRL+B
Italic	CTRL+I
Underline	CTRL+U
Cancel	Esc
Undo	CTRL+Z
Re-do	CTRL+Y