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Graphs and charts

In this part you will learn how to:

- select the most appropriate graph or chart for a given task
- create a graph or chart
- label a graph or chart
- extract segments from a pie chart
- change chart colours to print in black and white
- add a secondary axis
- set axis scales.

For this chapter you will need these

- employees
- project.
- rainfall.
- webhits

Chart types

You may be asked to select an appropriate chart for a purpose. Which chart is the most appropriate is often very difficult to work out. The choice will be between a pie chart, a bar chart and a line graph.

Pie charts

If you are asked to compare percentage values, a pie chart is often the most appropriate type because pie charts **compare parts of a whole** or fractions of a whole. An example would be comparing the percentage of children who preferred ice cream, jelly or trifle.

Bar charts

Bar charts show the difference between different things. A bar chart is traditionally a graph with vertical bars, but it is called a column graph in *Excel*. This is a little confusing but to create a vertical bar chart you would need to use the 'column chart' and for a horizontal bar chart (with the bars going across the page) you would need to use the 'bar chart'. An example would be showing the number of items sold by five people in the same month.

Advice

Do not use stacked column charts or stacked bar charts.

Line graphs

Line graphs are used to plot **trends** between two variables. An example would be plotting the temperature of water as it was heated against time. You could then find any point in time on the graph and be able to read the corresponding temperature, even if the temperature had not been taken at that time.

Create a chart

To create a chart, you have to highlight the data that you wish to use. This is highlighted in the same way as other data in the spreadsheet. Sometimes you need to create a graph or chart using **contiguous** data (the data you use for this is in columns which are next to each other, e.g. columns B and C). Other times you need to create a graph or chart using **non-contiguous** data (the data you use for this is in columns which are not next to each other, e.g. columns B and F). To select non-contiguous data, hold down the <Ctrl> key while making your selections.



Task 1a

Open the employees worksheet. This shows the job types, the number of employees with that job type and the percentage of employees with that job type.

Create an appropriate graph or chat to show the number of employees with that job type.

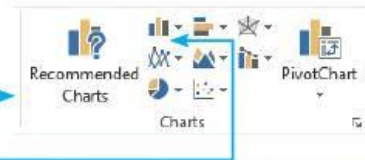
Open the file and highlight only cells A1 to B8 (which is an example of contiguous data). The highlighted data should look like this.

	A	B	C
1	JobTitle	Number of staff	Percentage
2	Director	3	0.048387097
3	Engineer	12	0.193548387
4	Analyst	4	0.064516129
5	Sales	16	0.258064516
6	Programmer	9	0.14516129
7	Tester	5	0.080645161
8	Clerical	13	0.209677419
9		62	

This highlighted area will be the cells used to produce the graph. Notice that the cells containing the column headings (A1 and B1) have been included in this selection as they will be used as the labels in the chart (they can be changed later if the question asks for different labels).

Decide what type of chart you will need for this task. Look at the data and decide if it compares parts of a whole, shows trends between two variables or shows the difference. In this task the data shows the different numbers of employees in each job type, so a bar chart is the most appropriate chart type, and in this case you can use a vertical bar chart.

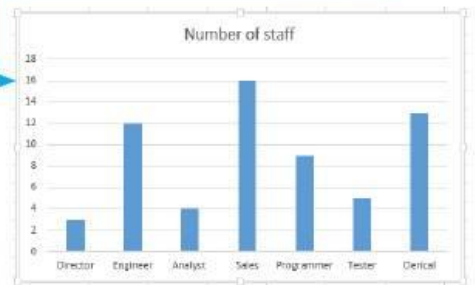
Select the **INSERT** tab and find the **Charts** section.



Select a vertical bar chart (labelled **Column** in *Excel*); this can be selected using the small icon of a bar chart or, in this case, it could also be found using *Excel's* 'Recommended Charts' (please note that this feature does not always select the most appropriate type chart for a given task). Click on the bar chart icon and the **Insert Chart** window appears, with the vertical bar chart (called a column chart in *Excel*) selected. If you select the wrong chart type you can always click on the chart types on the left of this window to change it. Selecting each chart type from the left, and each sub type from the icons along the top of this window, you can see the different graphs and charts to choose from. Select the chart shown and click **OK**.



The chart will look similar to this.



Advice

Keep your charts simple – do not use 3-D charts or add features that are not a necessary part of a task.
A simple chart is often more effective.

Task 1b

Continue to work on employees worksheet.

Create an appropriate graph or chat to show the percentage of employees with that job type.

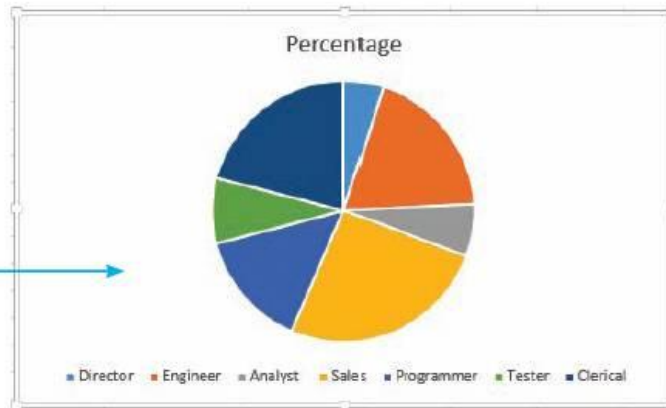
Open the file and, using the <Ctrl> key and the mouse, highlight cells A1 to A8 and C1 to C8 (which is an example of non-contiguous data). Do not highlight any other cells. The highlighted spreadsheet should look like this.

	A	B	C
1	JobTitle	Number of staff	Percentage
2	Director	3	0.048387097
3	Engineer	12	0.193548387
4	Analyst	4	0.064516129
5	Sales	16	0.258064516
6	Programmer	9	0.14516129
7	Tester	5	0.080645161
8	Clerical	13	0.209677419
9		62	

Decide what type of chart you will need for this task. Again, look at the data and decide if it compares parts of a whole, shows trends between two variables or shows the difference. In this task the data compares parts of the whole, so a pie chart is the most appropriate chart type. Select the **INSERT** tab and find the **Charts** section. Then select a **Pie** chart and the **2-D Pie**.



The finished pie chart will look like this.



Task 2a

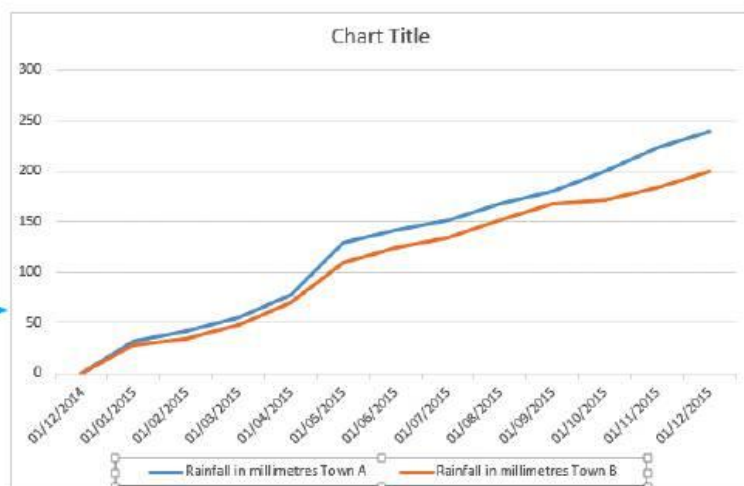
Open the rainfall worksheet.

Create an appropriate graph or chart to show a comparison of the monthly data for towns A and B.

Open the file and highlight cells A1 to C15. Decide what type of chart you will need for this task. Again, look at the data and decide if it compares parts of a whole, shows trends between two variables or shows the difference. This task mentions periods of time, which suggests a trend. In this task, it is seeing how the total amount of rainfall changes/varies over a period of 12 months. Because specific dates are used and the rainfall is cumulative, a line graph is the most appropriate chart type. As there are two towns shown in the data, you will make a comparative line graph using both data sets. Select the **INSERT** tab and, in the **Charts** section, select a **Line** graph and the **2-D Line** (the top left icon).



The finished line graph will look like this.



Label a chart

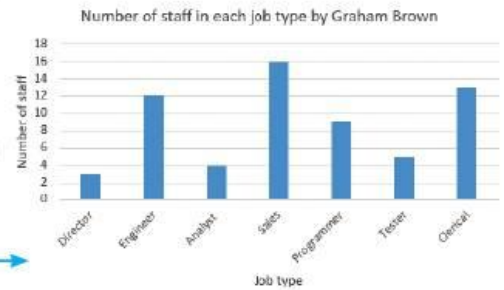
Task 1a

Go to the chart you have done in Task 1a and add appropriate labels.

Although *Excel* attempts to complete the chart – it has added a chart title and axis labels – it is still incomplete. All charts need fully labelling. Use the **Chart Elements** icon to add other elements, in this case value and category axis labels. Move the cursor into each label box and type each label.



If you are given the chart title, enter it very carefully and exactly as shown in the question paper; if not, change the text in the question into a chart title so that it gives as much information as possible to the reader. Include your name, Centre number and candidate number in the chart labelling. As there is only one set of values (data series) in this chart, a legend (or key) is not needed. Save this chart for later use. The finished chart may look like this.



Important Note:

As you see in order to complete “Tasks”, students need to follow provided easy-to-follow step-by-step instructions, so that practical skills are developed alongside knowledge and understanding. But, students should complete “Activities” by themselves in order to confirm their understanding of the Graphs and Charts concept.

Advice

The category axis in a vertical bar chart is the x axis and displays the names of the different categories; the value axis is the y axis and displays the number values.

Activity 3a

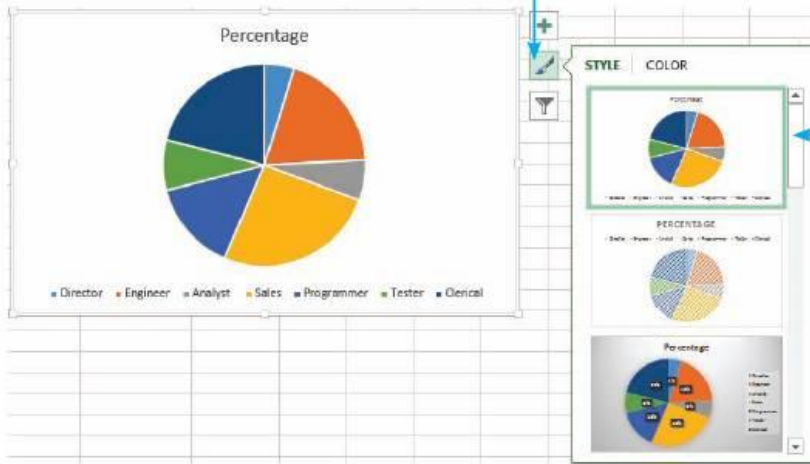
Open the webhits worksheet. This contains data about the number of members of an online book club and the average number of website hits each week over a nine-year period. Create and label an appropriate graph or chart to show a comparison of these two sets of data. (Hint: check the first page to find correct chart type for this activity.)

Task 1b

Go to the chart you have done in Task 1b.

Display all segment labels and percentage values on the chart. Do not display a legend. Extract the segment for engineers. Make this segment red.

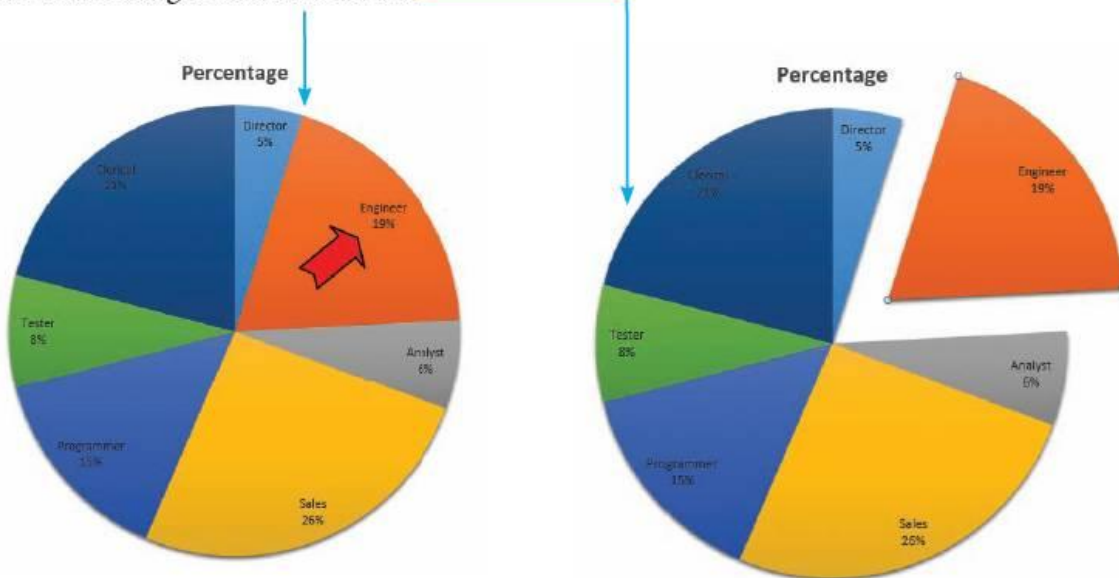
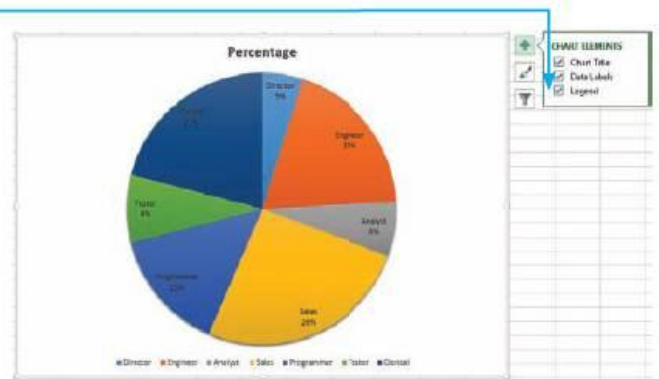
Click on the chart with the left mouse button and use the **Style icon** to display a list of styles to choose from. You can scroll through the list and choose the style you want.



Careful selection here can save you a lot of work. Sometimes the best choice can also contain a legend but this is easy to remove. Select the **Chart Elements** icon and remove the tick from the legend box.

To extract the segment for Engineer, click the left mouse button on the segment (but not on the labels), hold the mouse button down and slowly drag the segment out in the direction shown by the red arrow.

The chart changes from this to this.

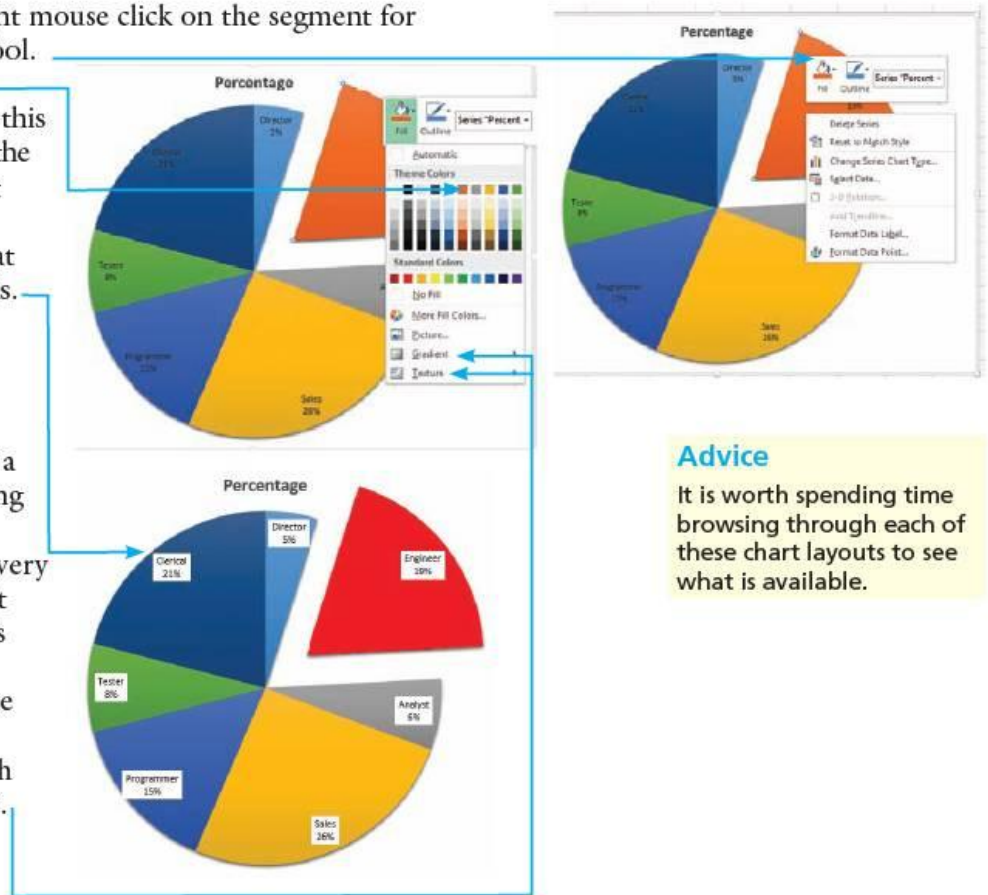


To make this segment red, right mouse click on the segment for engineers and select the **Fill** tool.

The drop-down palette of theme colours appears. For this task, select the red colour for the segment and the task is almost complete.

Use the same method so that the text is easy to read, like this.

The **Fill** tool is very useful in many types of chart, including bar charts, for changing the colours of different segments or bars. If a chart (or a document including a chart) has to be printed in black and white, it would be very difficult to tell which segment or bar is which. So that charts displayed or printed in black and white are easy to read, use the range of texture, pattern and gradient fills to make each bar or segment look different.



Advice
It is worth spending time browsing through each of these chart layouts to see what is available.

Important Note:
As you see in order to complete “Tasks”, students need to follow provided easy-to-follow step-by-step instructions, so that practical skills are developed alongside knowledge and understanding. But, students should complete “Activities” by themselves in order to confirm their understanding of the Graphs and Charts concept.

Activity 4a
Open the project worksheet.
Create a pie chart to compare the number of hours worked by the people with each type of job. Make sure that each type of job can be clearly identified.

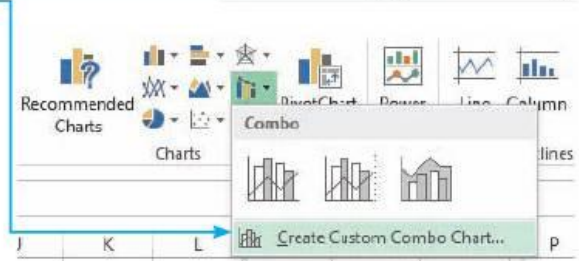
16.4 Use secondary axes

Task 2b
Open the rainfall worksheet.
Create an appropriate graph or chart to show a comparison of the rainfall and average temperatures for each month in only town A. Add a second value axis to the chart for the temperature series and label and scale these axes appropriately.

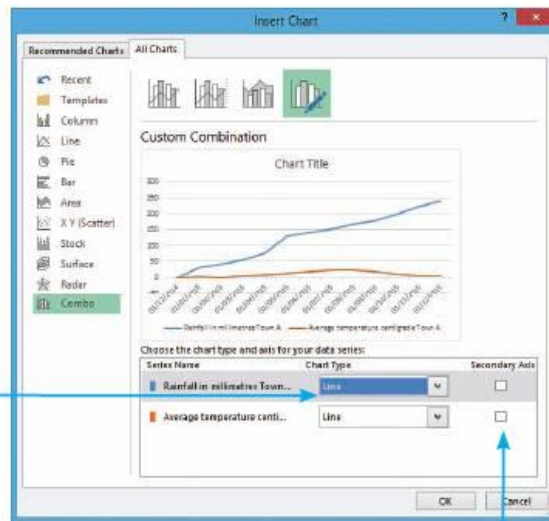
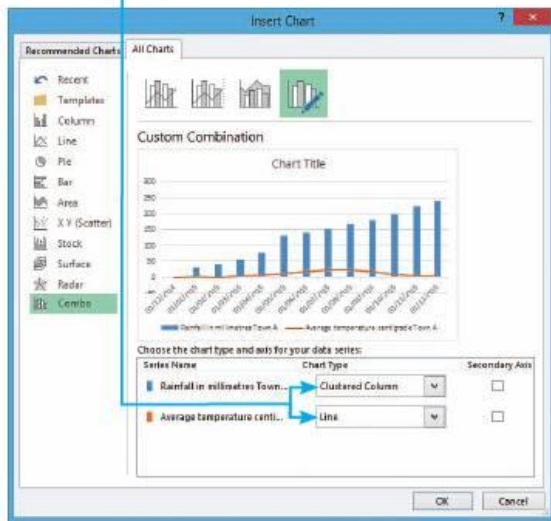
Open the file rainfall and highlight the dates and data for town A; this is in cells A1 to B15 and D1 to D15. Select the **INSERT** tab then, in the **Charts** section, select the **Insert Combo Chart** icon.



Use the bottom option to **Create Custom Combo Chart**, which allows you to compare two values using bar charts and/or line graphs and opens the **Insert Chart** window set to Combination charts.



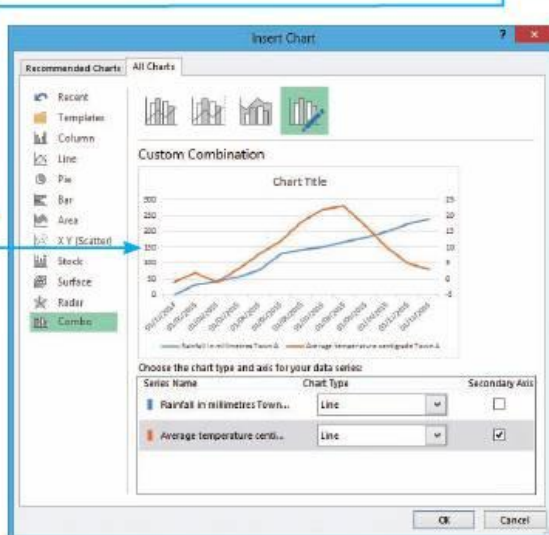
Both of the data series chosen show trends between two variables (rainfall will be plotted against the date, and average temperature will be plotted against the date) so using line graphs for both series would be the most appropriate chart types. To make this happen choose the **Chart Type** as **Line** for both series, like this.



It is difficult to read the values for the temperature, so adding and scaling a second value axis will make it easier to read the graph.

Click the left mouse button in the tick box for **Secondary Axis** for the temperature data series (the one shown in orange).

Your graph will now look similar to this. Click the **OK** button to create the chart.

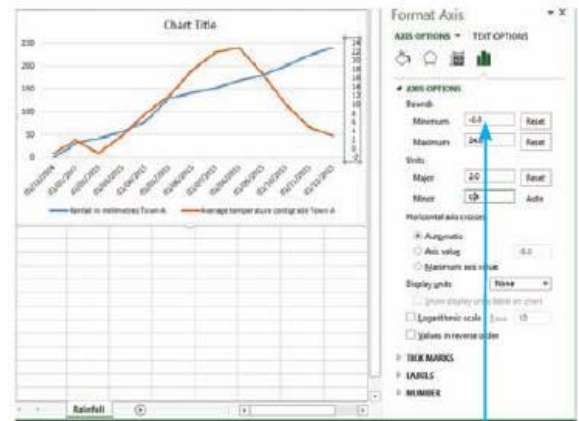


Excel has attempted to scale these axes but you are now going to adjust them further. You will change the primary axis so that it is set between 0 and 250 and the secondary axis so that it is set between -2 and 24. These values have been extracted from the original data: the total cumulative rainfall is 240 mm (so we will choose 250, so that the scale can go up in steps of 50); the temperature changes between -1 and 23 degrees (so we will use -2 and 24 so the scale can go up in steps of 2). For this axis it would be acceptable to use the values -5 to 25 suggested by *Excel*.

GRAPHS AND CHARTS

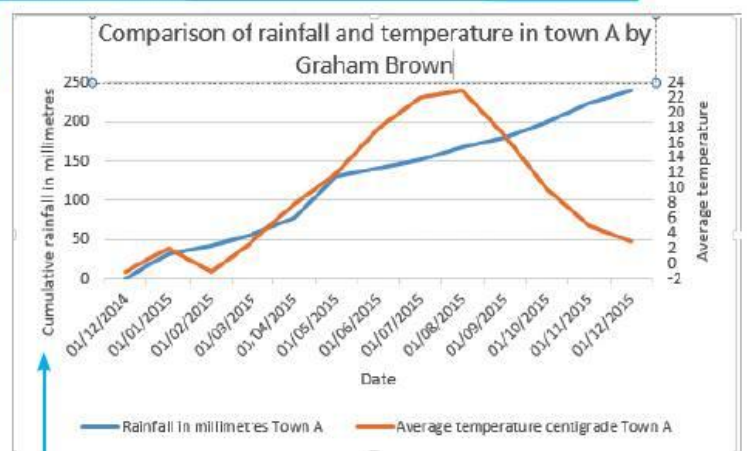
To change the primary axis values, double click on the axis labels like this.

This opens the **Format Axis** pane at the right side of the window. In the **Axis Options** sections the **Axis Bounds** are set to 0 and 300. We want the bounds set to 0 and 250, so edit the **Maximum** boundary to 250. Press the <Enter> key or click the left mouse button to refresh the chart.



Follow a similar procedure for the secondary axis. Double click the left mouse button on the axis then change the axis settings with a **Minimum** value of -2, a **Maximum** value of 24 and, in the **Units** section, set the **Major Unit** to 2. The **Minor Unit** will change automatically.

It is important to label these axes appropriately. Label the primary axis (the left one) 'Cumulative rainfall in millimetres' and the secondary axis 'Average temperature'. Label the category axis 'Date'. Label the chart with a meaningful title, such as 'Comparison of rainfall and temperature in town A by <your name>'. These changes should leave the chart looking like this.



Activity 3a

Go to the chart you have done in Activity 3a.

Add a second value axis to the chart for the number of members and set the maximum value for this axis to 3200 and keep the minimum value at 0.



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