# E2 *Data Presentation* Introduction

## *Learning objectives*

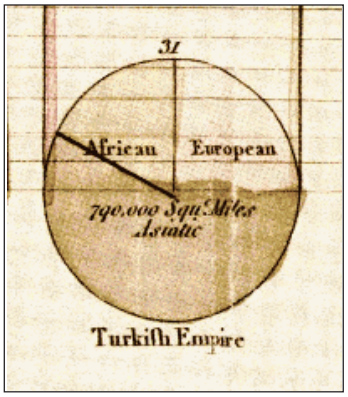
This unit continues the topics of *data collection* and *data presentation* and illustrates different ways in which you can present data. You will have already met *bar charts* in Unit E1; now you will become familiar with *pie charts*, *line graphs* and *histograms*. After completing Unit E2, you should understand how to construct and use

- pie charts to illustrate discrete data
- line graphs to illustrate data
- stem and leaf plots to illustrate numerical data
- histograms with equal class intervals to illustrate continuous data
- ✻ histograms with unequal class intervals to illustrate continuous data.

## *Introduction*

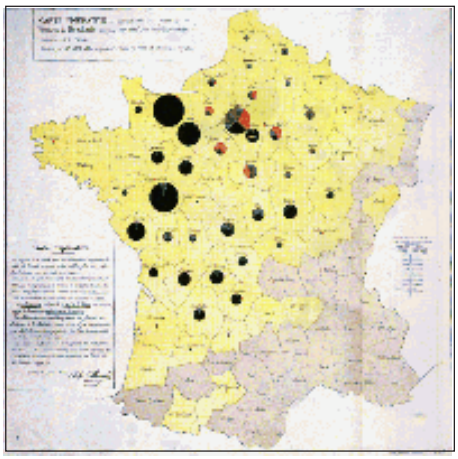
One of the really important topics covered in Unit E2 is that of *pie charts*, a useful and much-used method of illustrating discrete data.

The earliest known pie chart is generally credited to *William Playfair* in his 'Statistical Breviary' published in London in 1801, where two such graphs are used. Playfair (1759-1823) was a Scottish engineer and political economist, who is considered the founder of graphical methods of statistics.




*One of William Playfair's pie charts in his* Statistical Breviary*, depicting the proportions of the Turkish Empire located in Asia, Europe and Africa before 1789.*

The pie chart was not widely used at first; *Charles Joseph Minard* (1781-1870), a French civil engineer noted for his inventions in the field of information graphics, was one of the first to use it, in particular in maps where he needed to add information in a third dimension.



*Charles Minard's map using pie charts to represent the cattle sent from all around France for consumption in Paris (1858).*

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*Florence Nightingale* (1820 - 1910) is credited with developing a form of the pie chart now known as the polar area diagram, equivalent to a modern circular histogram, to illustrate seasonal sources of patient mortality in the military field hospital she managed. She made extensive use of such diagrams to present reports on the nature and magnitude of the conditions of medical care in the Crimean War to British Members of Parliament and civil servants who would have been unlikely to read or understand traditional statistical reports.

## *Key points and principles*

- Pie charts are a useful way of illustrating discrete data; for example, colour of cars, government spending for different ministries.
- Line graphs are particularly helpful when illustrating data that has a trend over time; for example, car sales per year, number of mobile phones bought each month.
- Stem and leaf plots are useful for grouping and displaying data.
- Histograms are used to illustrate *continuous* data with a frequency graph; there will be a continuous scale along the horizontal axis.

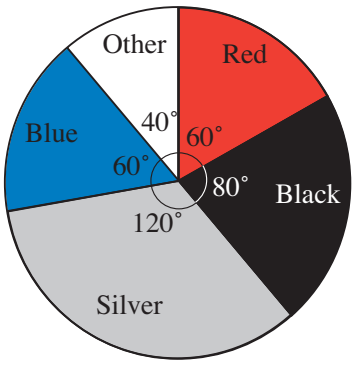
## *Facts to remember*

- Pie charts are used to illustrate discrete data
- Line graphs are used to illustrate data that has a trend
- Histograms (frequency graphs) are used to illustrate continuous data.

## *Glossary of terms*

*Pie chart* - used to illustrate *discrete* data.

For example, colours of cars recorded in a survey:




| *Colour* | *Number of cars* | *Proportion of total number* | *Angle* $(\times 360°)$ |
|---|---|---|---|
| Red | 15 | $\frac{15}{90}$ | 60° |
| Black | 20 | $\frac{20}{90}$ | 80° |
| Silver | 30 | $\frac{30}{90}$ | 120° |
| Blue | 15 | $\frac{15}{90}$ | 60° |
| Other | 10 | $\frac{10}{90}$ | 40° |
| Total | 90 | $\frac{90}{90} = 1$ | 360° |

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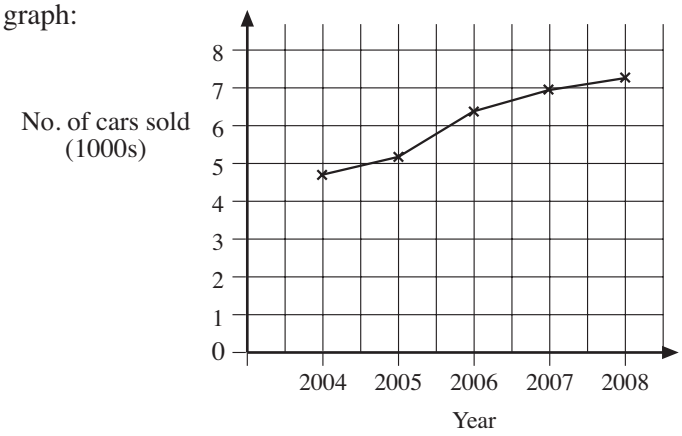
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*Line graph* - used to illustrate *trends* in data.

For example, numbers of cars sold per year:

| *Year* | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| *No. of cars sold* (1000s) | 4.7 | 5.1 | 6.3 | 6.9 | 7.3 |

Data shown on a line graph:




*Stem and leaf plot* - used to illustrate *numerical* data, providing a quick view of the characteristics of the data.

For example, the ages of the 15 teachers in a small school are:

27, 32, 28, 24, 37, 41, 50, 29, 25, 40, 55, 24, 33, 45, 29

The stem and leaf plot for this data is

| | |
|---|---|
| 2 | 4, 4, 5, 7, 8, 9, 9 |
| 3 | 2, 3, 7 |
| 4 | 0, 1, 5 |
| 5 | 0, 5 |

*Histogram (or frequency graph)* - used to illustrate *continuous* data.

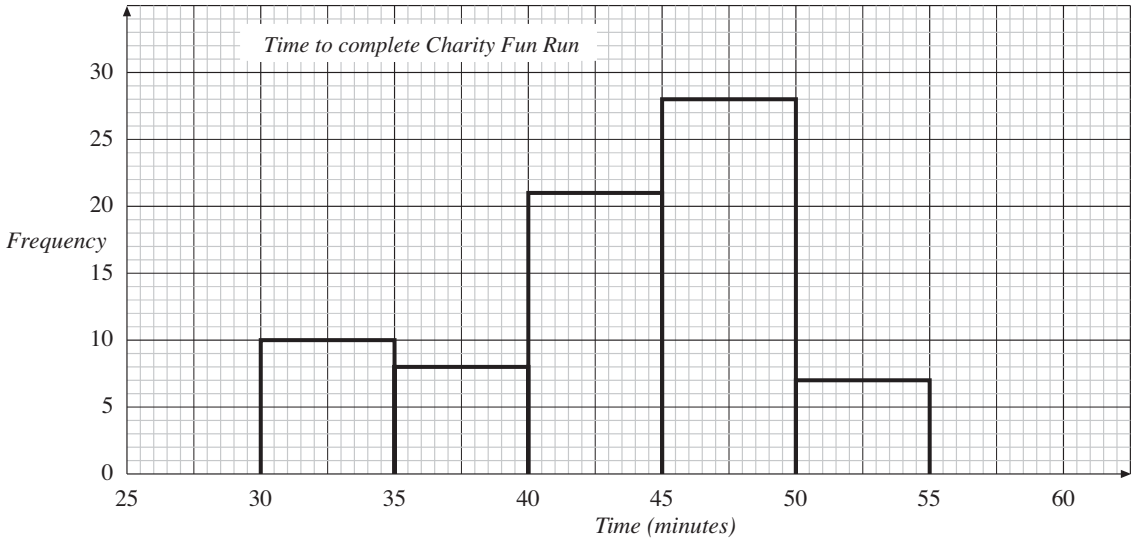
For example, times taken for competitors to complete a Charity Fun Run:

| *Time (mins)* | *Frequency* |
|---|---|
| 25 - 30 | 0 |
| 30 - 35 | 10 |
| 35 - 40 | 8 |
| 40 - 45 | 21 |
| 45 - 50 | 28 |
| 50 - 55 | 7 |
| 55 - 60 | 0 |

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Data shown on a histogram:




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