# Data Analysis

**Specification requirement**—Presenting, interpreting and analysing data, e.g. pie charts, histograms, index numbers.

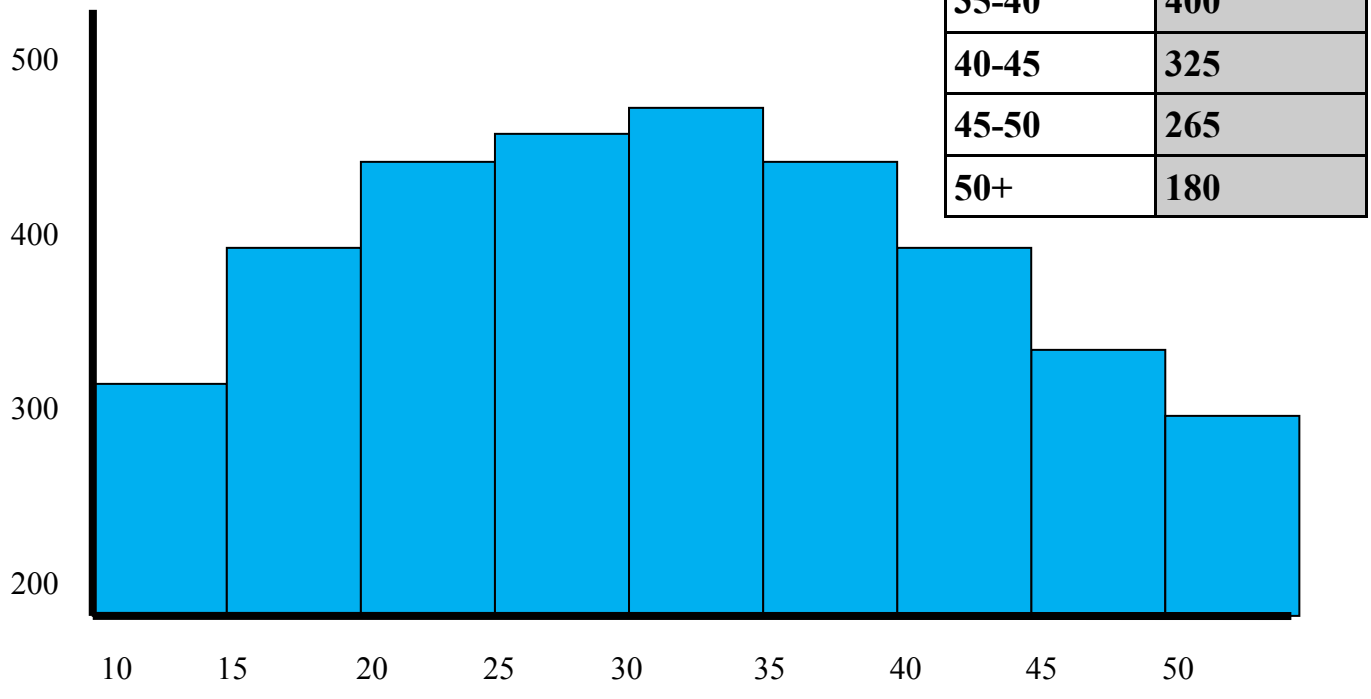
## Histograms

A Histogram is a summary graph, giving totals within various ranges of data. So a straight forward example might show the height range of pupils within a class of 12 year olds. If we were to divide the class into ranges of data based on 5cm brands, we could have bands of 151-155 cm, 156-169cm and so on. Each of these bands is referred to as a group and are shown on the horizontal axis (X Axis). How often a group occurs is known as the frequency, which is shown on the vertical axis (Y Axis). So the frequency for those between 151-155cm might be 11. 11 pupils in the class are between 151, and 155 cm tall.

The correct name for the table from which the histogram is drawn, is a frequency table. The table below shows a more business focussed example.

**Results from a customer income survey**

| Income in 000's | Frequency |
|---|---|
| 10–15 | 200 |
| 15-20 | 330 |
| 20-25 | 400 |
| 25-30 | 420 |
| 30-35 | 440 |
| 35-40 | 400 |
| 40-45 | 325 |
| 45-50 | 265 |
| 50+ | 180 |



The main advantage of using a histogram to display data is that it shows the shape of the distribution for a large set of data, in our example on the previous page, we see that the main income bands are around the £20,000 to £40,000 income range. Histograms are excellent when displaying data which have natural categories or groupings, so we might use them for age groupings, as well as income groupings. Using Histograms to display data also helps depict large differences in shape or symmetry of data collected.

Histograms do have weaknesses when used for displaying data. Firstly histograms cannot be used for more precise judgments such as depicting individual values. They show groups of values. Also the effectiveness of data falls when the range of data is too wide. What would be the point of a histogram used to analyse the age of a magazines readership if the range was 0-20, 20-40 and so on?

## Index Numbers

Index numbers are a useful method of showing changes over time in collections of data such as price levels or economic output. Using Index Numbers allows data to be standardised over time so that the data id easily comparable. The example below explains how this works.

Say in 1990 the average weekly income was £400, to turn this into the base index number of 100 (all index tables start with a base year and the figure for that year is always 100), we use the following formula;

$$\text{Index for any time period n} = \frac{\text{value in period n}}{\text{value in base period}} \times 100$$

$$\frac{400}{400} \quad \text{X } 100 = 100$$

In 2000 the average weekly wage had increased to £465. To turn this into the index number for 2000 we use the same formula.

$$\frac{465}{400} \quad \text{X } 100 = 116.25$$

From this data we can then say that wages in pure monetary terms have increased 16.25% (116.25-100).

The figures below are for a firms output, try converting these into index numbers.

| Year | Output | Index Number |
|---|---|---|
| 1990 | 11300 | |
| 1991 | 12010 | |
| 1992 | 12400 | |
| 1993 | 12540 | |
| 1994 | 12700 | |
| 1995 | 12850 | |
| 1996 | 13400 | |

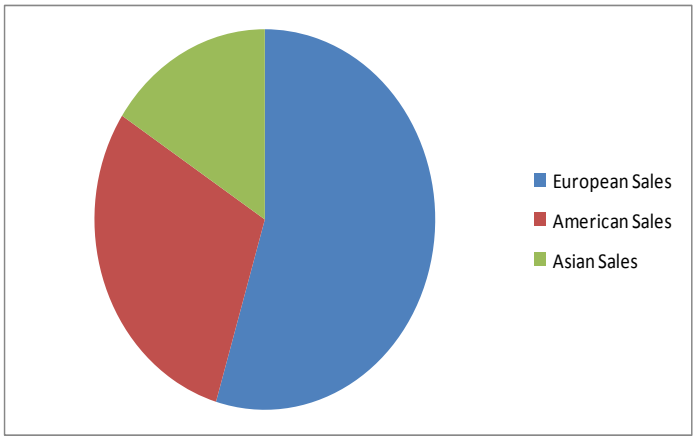
Index numbers are useful in business because managers are often concerned with the way in which values such as. prices paid for raw materials; numbers of employees and customers, sales, output, productivity and profits, etc. may change over time.
Index numbers are often used for economic analysis, and perhaps the most recognised of this sort of data are measures for inflation such as the Consumer Prices Index (CPI), or the Retail Prices Index (RPI)

The main advantage of using Index Numbers to compare changes over time and to make the value of these changes clear. For example when measuring changing prices, the price levels in the current year (indexed figure) year is compared to price levels in the previous year (previous years indexed figure). This will then give us the rate of price increase – inflation. This sort of data is useful to managers as it can potentially indicate how much wages and prices should change by.
These indexed changes can also be used to measure increases in output, productivity, costs, wastage etc. They can be used to help set targets for improvement, and make judgements on the effectiveness of policies used, For example Index Numbers may be helpful in judging the effect of certain policies adopted by the government designed to stimulate industrial production and employment. To a manager, they are helpful in comparing productivity in his own business with that of an industry.

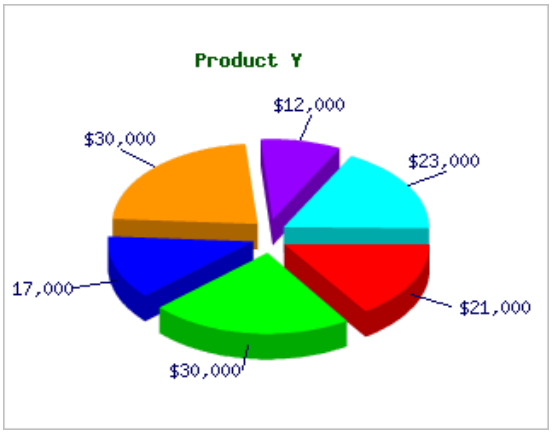
## Pie Charts

What is a pie chart?
A pie chart is a circular chart (pie-shaped); it is split into segments to show percentages or the relative value of different categories of data for example European, American and Asian sales as shown below.

When is it best to use pie charts?




A pie chart gives a good visual impression of the relative sizes or the shares of a whole . It is an excellent method of representing data if you wish to compare a part of a group with the whole group. You could use a pie chart to show, market income, or market shares for different products, or something more specific such as different types of pizza sold by a pizza chain. Pie charts don't give very detailed information, but they do give an effective overall picture of the information presented. More detail can be added into pie charts by inserting information into each segment of the pie, such as sales figures as in the pie chart below.




Pie charts

are also useful for inter firm comparisons such as the mix of products that different supermarket groups sell. When pie charts are used to compare in this way, opportunities for increased sales or where failures are occurring can be identified.

Pie charts are not effective for showing increases, or decreases over time. Trends are not shown and data cannot be extrapolated. Also they fail to shown relationships such as advertising spend v sales income i.e. dependencies.

Notes