

4

Statistics

A strong grasp of statistics is vital if you are to be successful in business. Statistics can be used to analyse data and help you make decisions. In this chapter we will be considering the different ways in which we represent data, different methods of analysing data and finally how we can perform some statistical tests to aid decision making.

4.1 Representing Data

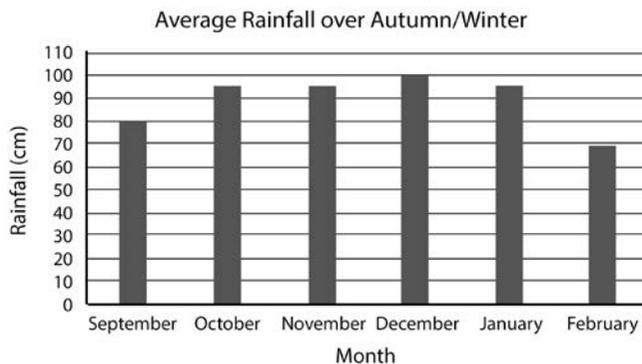
There are many different ways of representing data depending on the type of data that you have. In this section we will be looking at bar charts, histograms, line graphs, pie charts and scatter diagrams.

4.1.1 Bar Charts

We use bar charts to compare two or more values with a small set of results. When we represent data with a bar chart, the height of the bar shows the frequency of the result occurring.

Example 4.1.1

The average rainfall for a six month period is illustrated in the bar chart below:



Calculate the total rainfall for the whole of the six month period.

To calculate the total rainfall for the six months shown we must read off the amount of rainfall each month. By looking at the graph we see that there was 80cm of rainfall in September, 95cm in October, a further 95cm in November, 100cm in December, 95cm in

January and February was the driest month with 70cm. Therefore the total rainfall is the sum of all these values, i.e.

$$80 + 95 + 95 + 100 + 95 + 70 = 535$$

Therefore over the six months there was 535cm of rainfall.

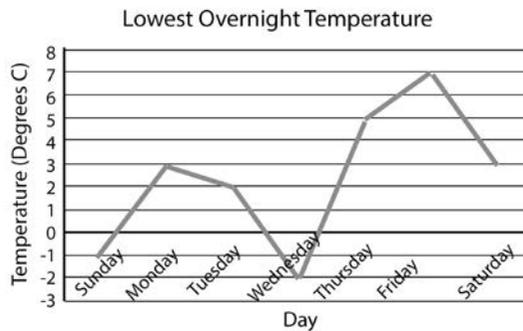
4.1.2 Line Graphs

A line graph is used to show trends in data over time. Line graphs are typically used to show a trend over a number of hours, days or months. They are plotted as a series of points which are connected by a straight line. The first and last points of the line do not need to join to the axes.

Example 4.1.2

The following line graph shows the lowest overnight temperature for a week.

1. What was the lowest temperature and on which day did it occur?
2. What was the difference between the highest and lowest temperature?



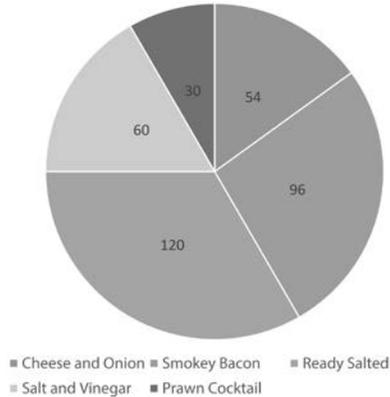
1. The lowest temperature can be seen to occur on Wednesday and the temperature on that particular evening was -2°C .
2. To calculate the difference between the highest and lowest temperatures we first need to find the highest temperature (we found the lowest in the previous question). From the line graph we can see that the highest temperature was 7°C which occurred on Friday. The difference therefore between the highest and lowest temperature is given by $7 - (-2) = 9$.

4.1.3 Pie Charts

Pie charts use various sized sectors of a circle to represent the data. To interpret a pie chart we need to recall that there are 360° in a circle to calculate the size of each segment.

Example 4.1.3

A market research company runs a survey to determine the most popular flavour of crisp. 60 students were asked and the findings are illustrated in the pie chart below. Given that the numbers represent the angle of each sector of the pie chart, how many people preferred salt and vinegar crisps?



To calculate the number of people who preferred salt and vinegar crisps we need to determine the angle which represents the salt and vinegar flavour. We can see from the pie chart that salt and vinegar was represented by a segment of 60°. To calculate the number of people that this represents we use the following:

$$\text{total number} = \frac{\text{angle}}{360} \times \text{number of people in the survey} = \frac{60}{360} \times 360 = 10$$

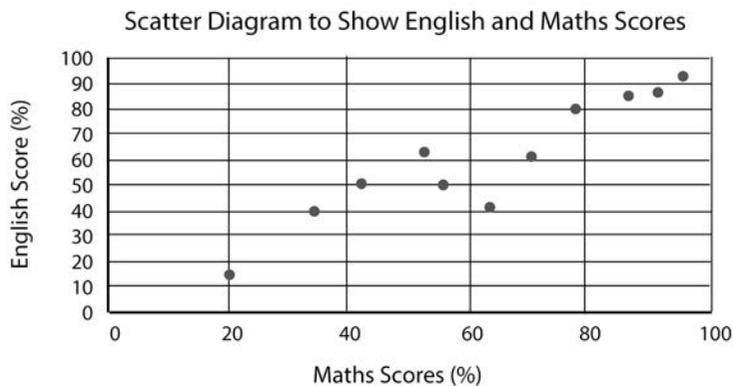
We can therefore see that there were 10 people who voted for salt and vinegar as their favourite flavour.

4.1.4 Scatter Diagrams

Scatter diagrams show the relationship between two sets of data. We can then describe the relationship between the two variables using correlation.

Example 4.1.4

In the scatter diagram below, the grades for recent Maths and English tests are displayed. Describe the relationship (if any) between the grades.



It should be clear from the scatter diagram that those students who scored highly in the Maths test, also scored highly in the English test.