Interpretation of data

GETTING STARTED

Look at some examples of tabulated data. With a partner, discuss what you each think the data is telling you. Do you and your partner have the same opinion or interpretation?

When you look at a table of data, it is not always obvious what information the data are telling us, especially if the categories that the data is divided into are not equal. It is important, however, that we are able to interpret and understand the data so that we can use it to help design or redesign engineered components or products.

Comparison of trends and patterns

Sometimes a table of data alone can be enough to allow us to compare results and identify a trend or pattern; for example, in Table 3.5 it can be clearly seen that as time increases, the distance from the start point also increases.

Table 3.5: Distance travelled compared to time

Distance–time comparison								
Time (seconds)	0	5	10	15	20	25	30	35
Distance (metres)	0	10	20	30	40	50	60	70

The data in Table 3.5 also show that for every 5 seconds of travel, the distance increases by 10 metres. Therefore, we have a linear (straight-line) relationship between distance and time, and there is probably no need to draw this as a graph. Sometimes, however, the results of an investigation can be harder to interpret as patterns may not be so clear.

ACTIVITY

Find a table of data from the internet (or obtain one from your teacher). Make sure that there are around ten rows in the table; this should be enough to identify a pattern.

1. Look at the data in the table. Can you see a trend or pattern? Write down your initial thoughts.
2. Plot the data on a scatter graph and draw a line of best fit.
3. Compare the graph with your initial thoughts. Did you successfully identify the trend?

V (V)	*I* (A)
0.00	0.00
1.50	0.40
3.00	0.78
4.50	1.00
6.00	1.15
7.50	1.28
9.00	1.42
12.00	1.62

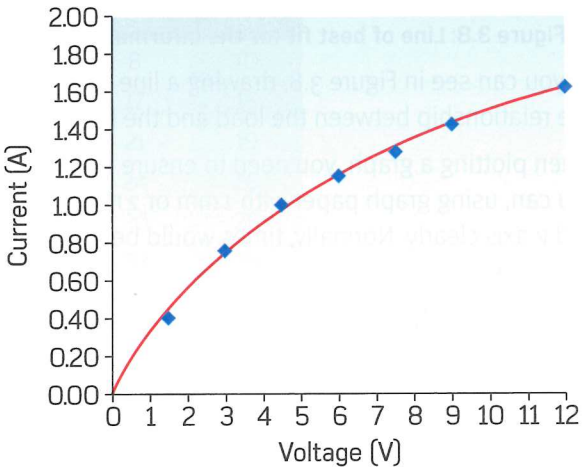

Figure 3.9: Table and chart showing current measured against voltage

In the table in Figure 3.9, you can see that as the voltage (*V*) increases, the current (*I*) also increases, but the rate of increase is not constant or linear. This tells us that we would not get a straight-line graph. The graph in Figure 3.9 shows all of the points plotted as a scatter graph with a curved line of best fit. The line indicates that there is a trend: as the voltage increases, the current increases but the rate of increase becomes slightly less.

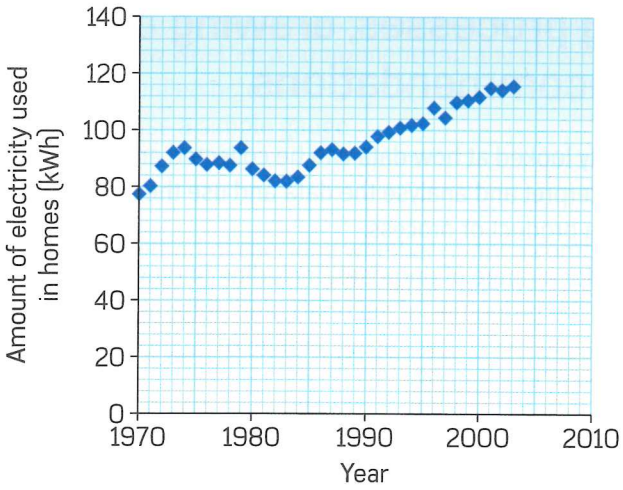

Figure 3.10: Scatter graph showing the use of electricity in homes

Figure 3.10, even though the values do not show an exact pattern, indicates that there is an upward (increasing) trend over a period of time. It would be possible to draw a line of best fit from the value in 1970 to the value in 2004, but this would not be an accurate representation of the information. This graph also shows an example of an anomalous result, which can be seen for the year 1979, where there was a large increase in the use of electricity compared with the years before and after.

Identifying anomalous results and sources of error

An anomalous result is one that does not fit the expected pattern or trend. Usually when we are carrying out an investigation, an anomalous result is caused by a mistake in taking readings or a faulty sample. To remove the possibility of anomalous results causing problems in an investigation, we take more than one reading for each value, as we did with the loaded spring investigation. This helps us to identify errors and find the possible sources such as, for example, an inaccurate measurement or a component with a flaw. It can be difficult to identify anomalous results in a table of data; however, when the data is presented in a scatter graph, they are easier to identify. In the scatter graph in Figure 3.11, anomalous results are circled.

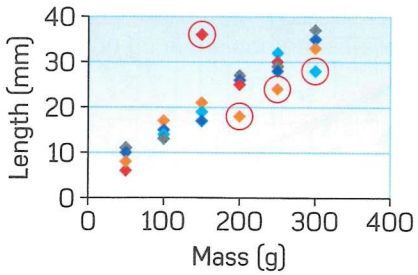

Figure 3.11: Scatter graph with anomalous results identified

CHECK MY LEARNING

You have learned about the comparison of trends and patterns in data and about the identification of anomalous results from investigations, as well as the potential causes of these results. With a partner, examine some scatter graphs from practical investigations and see if you can identify any anomalous results.