# Analysing data

- Calculating the range, mean, median and mode from a set of data and from a frequency diagram
- Understanding that statistics can be misleading
- Constructing a stem and leaf diagram
- Calculating the range, median and mode from a stem and leaf diagram

Keywords

You should know

explanation 1a explanation 1b online

**1** These are the numbers of books five pupils have in their school bags.

5, 9, 4, 7, 5

Work out these statistics for the numbers.

**a** the range **b** the mode **c** the mean **d** the median

**2** These are the number of brothers and sisters ten pupils have.

3, 1, 1, 2, 0, 1, 2, 3, 0, 1

Work out these statistics for the numbers.

**a** the range **b** the mode **c** the mean **d** the median

**3** Eight cars were waiting at traffic lights.
These are the numbers of people in each car.

1, 2, 3, 2, 1, 5, 1, 1

Work out these statistics for the numbers.

**a** the range **b** the mode **c** the mean **d** the median

**4** Ten pupils scored these marks out of 15 in a mental arithmetic test.

8, 15, 13, 13, 9, 10, 12, 8, 9, 13

Work out these statistics for the scores.

**a** the range **b** the mode **c** the mean **d** the median

**5** These are the weights in kilograms of 15 rugby players.

81, 110, 92, 95, 115, 118, 99, 95, 100, 102, 88, 89, 100, 111, 103

Work out these statistics for the weights.

**a** the range **b** the mode

**c** the mean **d** the median

**6** An Olympic 100 m sprinter ran these times, measured in seconds, in her last eight competitive races.

12.8, 12.7, 12.0, 12.1, 12.9, 12.1, 12.5, 11.9

Work out these statistics for the times.

**a** the range **b** the mode **c** the mean **d** the median

**7** These are the weights, in kilograms, of the five players in a 5-a-side hockey team.

60, 64, 58, 57, 61

**a** Calculate the total weight of the five players.

**b** Calculate the mean weight of the five players.

The mean weight of the five players and the substitute player is 61 kg.

**c** Calculate the total weight of the six players.

**d** Calculate the weight of the substitute.

explanation 2

**8** Here are two sets of data.

A 5, 9, 6, 5, 3, 8

B 11, 5, 2, 4, 5, 3

Work out these averages for each set of data.

**a** the mean **b** the median **c** the mode

**9** These are the number of goals scored by two football teams in their last ten matches.

Team 1 2, 0, 4, 0, 3, 0, 4, 3, 0, 4

Team 2 0, 2, 1, 0, 2, 1, 1, 3, 2, 2

**a** Work out these averages for each team.

**i** the mean **ii** the median **iii** the mode

**b** Which team do you think is better? Give a reason for your answer.

**10** A group of people watched two films.
They gave each film a score from 1 (poor) to 5 (excellent).
These are the results.

Film A 1, 2, 2, 5, 2, 1, 5, 5, 2, 1

Film B 3, 1, 4, 3, 2, 2, 3, 3, 1, 3

**a** Work out these averages for each film.

**i** the mean **ii** the median **iii** the mode

**b** Which average do you think would not be a good average to use in this case? Give a reason for your answer.

**11** Tony scored these marks out of 20 in his last eight maths tests.

4, 5, 20, 20, 3, 6, 2, 7

**a** Work out these averages for this data.

**i** the mean **ii** the median **iii** the mode

**b** Tony says that his average test score is 20. Is this true?

**c** Which average is the best to use when describing of Tony's results? Give reasons for your answer.

**12** Ten batteries from Sparks Batteries were tested. They lasted for these numbers of hours.

14.5, 16.2, 17.1, 3.3, 16.0, 17.2, 17.8, 3.3, 18.1, 17.0

**a** Work out these averages for the batteries.

**i** the mean **ii** the median

**iii** the mode

**b** A rival firm, Durable Batteries, claims that these results show that on average the Spark batteries only last 3.3 hours. Is this claim true? Give reasons for your answer.

**c** Explain, giving reasons, which is the most reliable form of average for this data.

explanation 3a explanation 3b online

**13** Sam asked 20 people to take part in a survey.

One question asked how many times they had moved house in the last 10 years.

The results are shown in this frequency table.

| **Number of times moved house** | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Frequency** | 2 | 7 | 5 | 3 | 2 | 1 |

**a** What is the modal number of times people have moved in the last 10 years?

**b** Sam wants to find the median number of times people moved house.

He knows that he has to put the 20 results in order and find the middle number.

He begins to work it out like this 0, 0, 1, 1, 1, 1, 1, 1, 1, …

Copy and complete his working to find the median.

**14** 20 pupils were asked how many months it was until their next birthday.

The results are shown in this table.

| **Number of months until next birthday** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Frequency** | 2 | 1 | 4 | 0 | 2 | 3 | 1 | 2 | 1 | 0 | 3 | 1 |

**a** What is the modal number of months pupils have to wait for their birthday?

**b** Find the median number of months until a pupil's next birthday.


**15** 25 pupils were asked how many hours they spent doing homework one night.

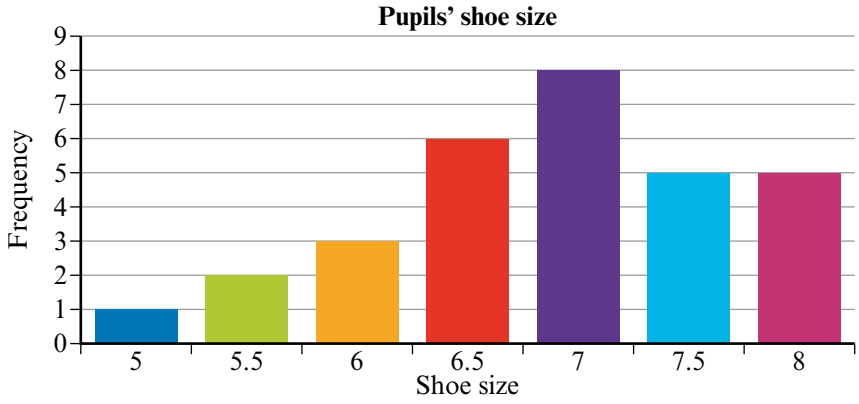
The results are given in this frequency table.

| **Number of hours spent doing homework** | **Frequency** |
|---|---|
| 0 | 2 |
| $\frac{1}{2}$ | 4 |
| 1 | 9 |
| $1\frac{1}{2}$ | 7 |
| 2 | 3 |

**a** Find the modal number of hours pupils spent doing homework.

**b** Work out the median length of time spent on homework.

**16** The shoe sizes of 30 pupils in a class are shown in the bar chart.

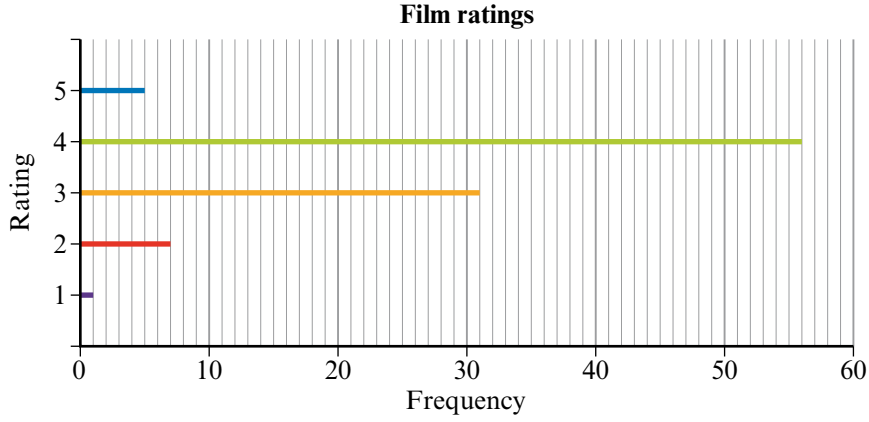



**a** How many pupils have a shoe size of 6?

**b** Find the modal shoe size of the pupils.

**c** Work out the median shoe size of the pupils.

***17** Reviewers were asked to look at a film and give it a rating from 1 to 5.
A score of 1 meant awful and 5 meant excellent.
Their responses are shown in the bar-line chart.




**a** How many people took part in the survey?

**b** How many people rated the film excellent?

**c** Find the modal rating for the film.

**d** Work out the median rating for the film.

explanation 4a | explanation 4b

**18** 15 caterpillars were measured.

Their lengths, in millimetres, are shown in this stem and leaf diagram.

| | |
|---|---|
| 0 | 9 |
| 1 | 2 2 9 |
| 2 | 1 4 5 5 8 9 |
| 3 | 4 6 6 6 |
| 4 | 1 |

Key: 2|1 represents a length of 21 mm

**a** How many caterpillars have a length of 12 mm?

**b** Write the length of the shortest caterpillar measured.

**c** Write the length of the longest caterpillar measured.

**d** Work out the range.

**e** Find the modal caterpillar length.

**f** What is the median caterpillar length?

**19** This stem and leaf diagram shows the time, in seconds, that each of 15 athletes took to run 400 m.

| | |
|---|---|
| 43 | 4 6 |
| 44 | 1 2 6 6 |
| 45 | 0 2 3 3 3 7 |
| 46 | 1 2 2 |

Key: 44|1 represents a time of 44.1 seconds

**a** How many athletes took 44.6 seconds to run 400 m?

**b** Write the modal time.

**c** Work out the median time.

**d** Work out the range.

**20** This stem and leaf diagram shows the heights, correct to the nearest centimetre, of 20 pupils.

| | |
|---|---|
| 15 | 6 7 7 7 8 |
| 16 | 0 1 4 5 5 7 8 8 8 |
| 17 | 1 1 2 3 4 6 |

Key: 17|1 represents a height of 171 cm

**a** Write the height of the tallest pupil.

**b** Write the height of the shortest pupil.

**c** Work out the range of the heights.

**d** Write the modal heights.

**e** Work out the median height.

**21** Jo wrote the number of items 20 of her friends each had in their pencil case.

3 3 4 6 6 7 8 9 11 12

13 13 13 14 14 15 16 20 22 23

Copy and complete this stem and leaf diagram.

| | |
|---|---|
| 0 | |
| 1 | |
| 2 | |

Key:

**22** 20 pupils sat a geography test. These are their percentage scores.

53, 76, 58, 61, 70, 84, 58, 66, 75, 87

48, 73, 91, 72, 82, 79, 59, 70, 88, 83

**a** Write the percentages in order of size. Start with the smallest.

**b** Draw a stem and leaf diagram for this data, remember to include a key.

**23** At a summer fair stall, people had to estimate the length of a model car.

Here are some of the estimates, in centimetres.

35.6 40.3 36.4 37.3 35.6 37.9 38.2 38.5 39.0 38.1

38.8 37.1 40.7 39.4 35.8 36.6 38.3 35.3 41.2 37.4

**a** Write the estimates in order of size. Start with the smallest.

**b** Draw a stem and leaf diagram for this data, remember to include a key.