Working with data

- Knowing which average to use for data
- Calculating an estimate for the mean of grouped data
- Identifying the class interval where the median lies for grouped data
- Identifying the modal class interval for grouped data
- Finding an estimate of the range for grouped data

Keywords

You should know

explanation 1a explanation 1b

1 Jordan wrote down the number of texts he received each hour one Saturday.

0, 1, 6, 2, 8, 5, 3, 5, 6, 3, 1, 1, 1, 2, 4

Find the range, mean, median and mode of the number of texts he received.

2 These are the number of red cards issued by 18 referees during premier league football matches one season.

3, 6, 0, 4, 5, 2, 2, 1, 2, 2, 2, 0, 1, 0, 1, 0, 0, 0

Find the range, mean, median and mode of the number of red cards issued.

3 Hervey counted the number of emails he received each day over a two-week period.

9, 10, 12, 9, 8, 11, 6, 0, 7, 12, 10, 8, 12, 6

Find the range, mean (to the nearest whole number), median and mode of the number of emails he received.

4 These are the results in an end-of-term test.

54, 34, 22, 29, 25, 20, 26, 28, 19, 16, 32, 31, 31, 41, 25

a Find the range, mean, median and mode of the marks.

b An extra mark was included and the mean changed to 28.5.
What was the new mark?

5 These are the average monthly temperatures, in degrees Celsius, in the Russian city of Vladivostok.

−14, −11, −3, +4, +9, +13, +18, +20, +16, +8, −2, −12

Find the range and mean (to 1 d.p.) of the monthly temperatures.

6 The mean of six numbers is 17.
Five of the numbers are 34, 12, 22, 10, and 15.
What is the sixth number?

7 Five numbers have a mean, mode, median and range of 4.
What are the numbers?

8 Eight pupils each took five examinations in June.
For each pair, write down 5 possible marks for each pupil.
Which pupil do you think did better?
Is there more than one possible answer?

a Emily had a range of 80% and Taylor had a range of 20%.

b Ryan had a mean of 56% and Cally had a mean of 50%.

c Kofi had a median of 56% and Jessica had a median of 60%.

d Josh had a mode of 50% and Chelsey had a mode of 84%.

explanation 2a explanation 2b

9 Which of the three averages, mean, median or mode, do you think might be used to find the following? Give a reason for your answer.

a Average age, in years and months, in a class.

b Average age, in years, in Uganda.

c Average shoe size in a class.

d Average number of children per couple in the UK.

e Favourite flavour of ice cream in the school.

f Average salary in a company where the manager Mr Big has a salary of £500 000 per year.

g Average weight of a baby at birth.

h Most common colour of car in the staff car park.

10 Max went to four different birthday parties last year.
He worked out statistics for the ages of the people attending each party.
Approximately what age was each party to celebrate? Explain how you know.
Part **a** has been completed for you.

a Range = 37 years, mean = 20.3 years, median = 15 years, mode = 15 years.
Most guests were aged 15 (mode = 15), half the guests were 15 or younger (median = 15) so it was a teenage party. The range of 37 years and mean of more than 20 show that some adults were also present.

b Range = 62 years, mean = 46.7 years, median = 49 years, mode = 50 years.

c Range = 40 years, mean = 12.2 years, median = 7 years, mode = 6 years.

d Range = 74 years, mean = 70.3 years, median = 79.5 years, mode = 80 years.

11 Cameron says that the average person has less than two legs.
Peter disagrees and says that the average person has two legs.
How did they calculate their answers? Which average is more appropriate to use?

12 Students with the top 50% of the marks in an exam pass; the others fail. Which average should the exam board use to set the pass mark? Explain your answer.

13 A local scout group consists of 4 adult leaders and 15 scouts who are between the ages of 11 and 14.

a Write possible ages for the members of the group.

b Calculate the mean, median, mode and range of the age of the members.

c Which averages represent the age of the group most fairly?
Explain your answer.

14 In 2007, the median age in Uganda was 14.9 years and the median age in Japan was 43.5 years.

a Describe one difference between the populations of Uganda and Japan.

b Why do you think the median age is low in many African countries?

c The UK had a median age of 39.6 years in 2007. What problems do you think a higher median age may cause the UK in the future?

explanation 3a | explanation 3b | explanation 3c | online

15 The grouped frequency table shows the number of lengths 30 pupils swam in 10 minutes.

Lengths swum in 10 minutes	Frequency
5–9	5
10–14	10
15–19	11
20–24	3
25–29	1

a Calculate an estimate of the mean number of lengths swum.

b Write the class interval in which the median lies.

c Find the modal class interval.

d Pupils who swam less than 10 lengths in 10 minutes have extra swimming lessons. What percentage of the class have extra swimming lessons?

16 At the school summer fete, people were asked to guess how many sweets there were in a jar. The table shows the results. The person whose guess was closest to the actual number of sweets won.

Guess for number of sweets in the jar	Frequency
76–100	12
101–125	23
126–150	20
151–175	15
176–200	8
201–225	2

a Calculate an estimate of the mean number of sweets people guessed were in the jar.

b Estimate the range of the guesses.

c There were 151 sweets in the jar.
How many people definitely guessed too many?

17 The table shows the number of pupils in mathematics lessons in a school.

Number of pupils in mathematics lesson	Frequency
1–5	4
6–10	5
11–15	8
16–20	5
21–25	11
26–30	19
Total	**52**

a Calculate an estimate of the mean number of pupils in a lesson.

b Write the class interval in which the median lies.

c Find the modal class size.

d Each teacher can teach a maximum of 7 lessons. What is the minimum possible number of mathematics teachers in the school?

18 This table shows the number of words in 50 sentences in a book written by a popular children's author.

Word per sentence	Frequency
1–4	12
5–8	24
9–12	12
13–16	1
17–20	1
Total	**50**

a Calculate an estimate of the mean number of words in each sentence to 1 d.p.

b Find the class interval in which the median lies.

c Find the modal class interval.

d Estimate the range of the number of words.

e Do you think a book written for adults will have a similar mean, mode, median and range? Explain your answer.

19 The table shows the number of pairs of shoes owned by the mothers of pupils in one class.

Pairs of shoes	Frequency
1–5	1
6–10	2
11–15	3
16–20	4
21–25	7
26–30	5
31–35	4
36–40	2
41–45	2

a Calculate an estimate of the mean number of pairs of shoes owned by these mothers.

b Find the modal class for the number of shoes owned.

c The mother of one pupil had 87 pairs of shoes. It was decided not to include her data in the table. If her data was included, describe how it would affect:

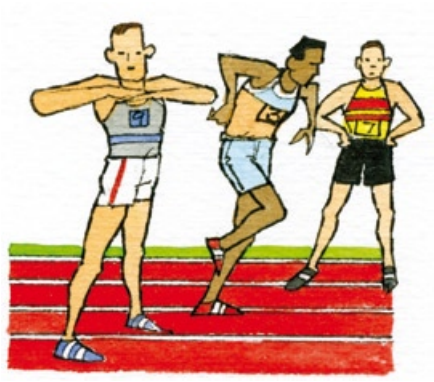
i the modal class

ii the estimate of the mean

explanation 4a explanation 4b online

20 This table shows the weight in kilograms of 12 athletes.

Weight, w (kg)	Frequency
$60 \leq w < 70$	1
$70 \leq w < 80$	3
$80 \leq w < 90$	5
$90 \leq w < 100$	2
$100 \leq w < 110$	1



a Calculate an estimate of the mean weight of an athlete to 1 d.p.

b Find the class interval in which the median lies.

c Find the modal class interval.

21 This table shows the height in centimetres of 100 pupils.

Height of pupils, h (cm)	Frequency
$130 \leq h < 140$	2
$140 \leq h < 150$	12
$150 \leq h < 160$	35
$160 \leq h < 170$	42
$170 \leq h < 180$	5
$180 \leq h < 190$	4

a Calculate an estimate of the mean height to 1 d.p.

b Find the class interval in which the median lies.

c Find the modal class interval.

d What fraction of pupils are at least 170 cm tall?

22 Researchers at the MacTasty Hamburger Restaurant surveyed the age of customers one Saturday afternoon and produced this frequency table.

Age, a (years)	Frequency
$0 \leq a < 5$	15
$5 \leq a < 10$	22
$10 \leq a < 15$	14
$15 \leq a < 20$	7
$20 \leq a < 30$	3
$30 \leq a < 45$	12
$45 \leq a < 60$	9
$60 \leq a < 80$	1

a Calculate an estimate of the mean age of customers.

b Find the class interval in which the median lies.

c Which average is most useful to define the age of the customers?

23 This table shows the time in seconds taken by the 15 finalists at a sports day to sprint 100 m.

Time, t (seconds)	Frequency
$11 \leq t < 12$	1
$12 \leq t < 13$	2
$13 \leq t < 14$	5
$14 \leq t < 15$	4
$15 \leq t < 16$	2
$16 \leq t < 17$	1

a Calculate an estimate of the mean time to 1 d.p.

b Find the class interval in which the median lies.

c Find the modal class interval.

d What percentage of finalists ran the race in less than 14 seconds?

24 A hospital investigated the incidence of low-birth-weight babies (weight less than 2500 g) born in March. These are the results.

Weight, w (g)	Frequency
$500 \leq w < 750$	1
$750 \leq w < 1000$	3
$1000 \leq w < 1250$	1
$1250 \leq w < 1500$	1
$1500 \leq w < 1750$	2
$1750 \leq w < 2000$	2
$2000 \leq w < 2250$	4
$2250 \leq w < 2500$	6

a Calculate an estimate of the mean birth weight to the nearest gram of these low-birth-weight babies.

b Find the class interval in which the median lies.

c Find the modal class interval.

d Extremely low birth weight is defined as less than 1000 g. What percentage of the low-birth-weight babies had an extremely low birth weight?

e 5% of the babies born at the hospital had a low birth weight. What was the total number of babies born at the hospital during March?