Analysing data (2)

- Estimating the mean of grouped continuous data
- Identifying the modal class of grouped data
- Realising that the mean of grouped data is often very close to the mean of the raw data

Keywords

You should know

explanation 1a | explanation 1b | online

1 This table shows the heights of one hundred 12–14-year-old pupils.

a Calculate the estimated mean height. Give your answer to 1 decimal place.

b What is the modal class?

Height (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

2 The grouped frequency table is based on a government census and shows how long it takes people to get to work.

a Calculate the estimated mean time to get to work in minutes.

b Explain why it is only possible to calculate an estimated mean from this table.

c How many workers spent 35 minutes or more travelling to work each day?

d What is the modal class?

e Approximately what percentage of the population work between 15 and 20 minutes from home?

Time (minutes)	Frequency (millions)
$0 \leq t < 5$	4
$5 \leq t < 10$	14
$10 \leq t < 15$	18
$15 \leq t < 20$	19
$20 \leq t < 25$	16
$25 \leq t < 30$	6
$30 \leq t < 35$	14
$35 \leq t < 40$	3
$40 \leq t < 45$	3
$45 \leq t < 60$	7

3 Taylor and Tilly are growing Scarlet Sprinter runner beans on their allotment.
The seed packet claims 'the smooth straight pods average 38 cm in length'.
The girls measure 25 beans and record the result in a grouped frequency table.
Use the table to comment on the packet's claim.
Give possible reasons for any difference in the results.

Length (cm)	Frequency
$30 \leq l < 32$	1
$32 \leq l < 34$	1
$34 \leq l < 36$	2
$36 \leq l < 38$	5
$38 \leq l < 40$	6
$40 \leq l < 42$	5
$42 \leq l < 44$	4
$44 \leq l < 46$	1

4 These are the prices of 20 houses for sale on an estate.

£146 000	£135 000	£123 950	£159 000	£145 000
£135 000	£146 500	£165 000	£157 500	£123 500
£153 000	£156 000	£132 750	£158 000	£136 000
£149 000	£146 250	£167 500	£148 950	£149 500

a Calculate the mean house price.

b Calculate the range of the house prices.

c Construct a grouped frequency table for this data.

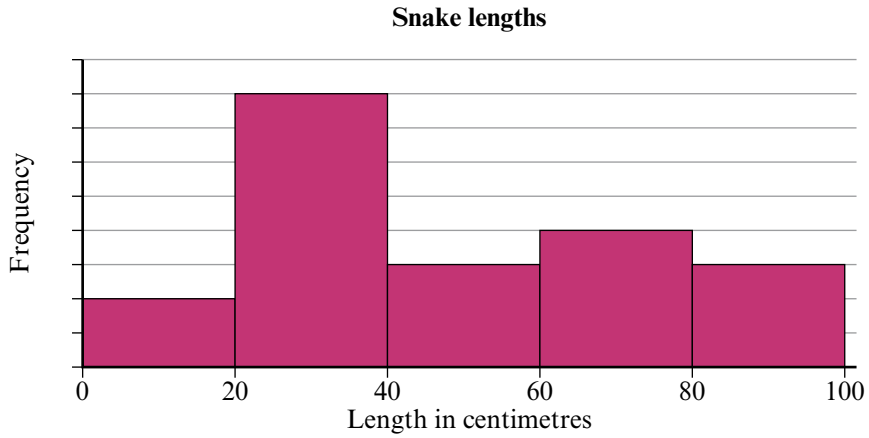
d Use your table to calculate an estimate of the mean of the house prices.

e Compare the mean obtained from the grouped and ungrouped data.

f What do you notice about the mode and the modal class?
Which represents the data better?

5 The grouped frequency diagram shows the lengths of 40 snakes at a snake farm.

The scale is missing from the axis showing the frequency.
You will need to use the table to work out what the values should be.



a Copy and complete this grouped frequency table.

Length (centimetres)	Frequency
$0 \leq L < 20$	
$20 \leq L < 40$	
$40 \leq L < 60$	6
$60 \leq L < 80$	
$80 \leq L < 100$	

b What is the modal group?

c Estimate the mean length of these snakes.

d What percentage of snakes are more than 40 cm but less than 80 cm long?

e Two new identical snakes are bought in and the estimate of the mean length of the snakes changes to 50 cm.
In which class interval will the length of these new snakes go?
Show your working.

6 Sam lives in Cambridge.
One summer he decides to visit 15 of his friends in different cities around the UK.
The cities and their distances by road from Cambridge are given in the table. The distances to City X and City Y are missing.
City Y is 200 miles further from Cambridge than City X.

City	Distance from Cambridge (km)
London	98
Portsmouth	216
City X	x
Manchester	258
Sheffield	197
Glasgow	566
Nottingham	139
Liverpool	309
Newcastle-upon-Tyne	369
City Y	y
Exeter	401
Perth	599
Birmingham	155
Leeds	237
Blackpool	366

a The mean distance of all the cities from Cambridge is 318 km.
Use this average to find the how far City X and City Y are from Cambridge.
Show your working.

b Construct an appropriate grouped frequency table for this data.

c Use your grouped data to find these distances.

i The estimated mean distance from Cambridge.

ii The modal group.

d Compare the averages for the grouped and ungrouped data.

7 These are the lengths in minutes and seconds of the tracks on two of Ben's CDs.

4:54	5:19	4:17	4:58	2:50	4:25
4:45	4:10	1:30	3:47	4:52	4:54
4:16	3:21	5:07	4:31	4:54	3:55
2:36	3:44	4:25	1:58	5:00	4:55

a **i** Find the mean track length in minutes and seconds to the nearest second.

ii Find the range of the track lengths in minutes and seconds.

b Copy and complete the grouped frequency table.

Time (minutes)	Frequency (millions)
$1:30 \leq t < 2:00$	
$2:00 \leq t < 2:30$	
$2:30 \leq t < 3:00$	
$3:00 \leq t < 3:30$	
$3:30 \leq t < 4:00$	
$4:00 \leq t < 4:30$	
$4:30 \leq t < 5:00$	
$5:00 \leq t < 5:30$	

c Use the table to find these times.
Give your answer in minutes and seconds to the nearest second.

i The estimated mean track length.

ii The modal class.

d Compare the mean and the mode or modal class obtained from the grouped and ungrouped data.