Comparing distributions

- Comparing data using averages and the range
- Interpreting more complex graphs
- Giving possible reasons for the shapes of graphs
- Justifying explanations using the evidence from calculations

Keywords

You should know

explanation 1a explanation 1b online

1 a Aziz is a striker for Aybury United football club.

These are the numbers of goals he scored in ten matches last season.

0 2 1 1 3 0 1 1 1 2

i Calculate the mean number of goals Aziz scored in each match.

ii What is the median number of goals Aziz scored?

iii What is the modal number of goals Aziz scored?

iv What is the range of Aziz's scores?

b Barney is a striker for Beeton Wanderers.

These are the number of goals he scored in ten matches last season.

0 0 4 0 5 0 0 1 0 3

i Calculate the mean number of goals Barney scored in each match.

ii What is the median number of goals Barney scored?

iii What is the modal number of goals Barney scored?

iv What is the range of Barney's scores?

c i Which player had the higher mean score?

ii Which player scored in more than half the matches?
Which average tells you this?

iii Which player was more consistent? Explain how you know.

2 The table shows the temperatures at noon in two holiday resorts, A and B, during the month of August. One resort is in England, the other in Portugal.

Day	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31
Temperature in Resort A (°C)	32	31	28	34	29	27	31	30	35	31	31	27	32	31	36	30
Temperature in Resort B (°C)	24	24	31	24	21	22	26	25	32	25	25	24	26	28	19	19

a **i** Suggest a type of graph that you could use to compare the data for the two resorts. Explain your choice.

ii Draw a graph to show the temperatures at noon in both resorts.

b For the set of temperatures at each resort, calculate these.

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

c Which of the resorts is likely to be in England and which in Portugal?

Explain your answer.

3 Two types of battery were tested to compare how long they last.
30 batteries of each type were tested. The results are shown in the tables.

Battery A	
Duration (hours)	**Frequency**
0 up to 5	0
5 up to 10	3
10 up to 15	5
15 up to 20	6
20 up to 25	6
25 up to 30	6
30 up to 35	4

Battery B	
Duration (hours)	**Frequency**
0 up to 5	0
5 up to 10	0
10 up to 15	12
15 up to 20	13
20 up to 25	4
25 up to 30	1
30 up to 35	0

a Draw a frequency diagram for the results of each battery.

b Which battery is more reliable? Explain your answer.

c A youth group is doing a sponsored 24-hour dance.
They need to choose the batteries that are most likely to last the full 24 hours.
Which battery type should they choose? Explain your answer.

4 The frequency table shows the results of a survey of the numbers of passengers in cars at 8:30 a.m. The survey was carried out outside a local school and on a motorway near a city.

Number of passengers	Frequency	
	Outside school	On motorway
0	4	31
1	10	11
2	5	5
3	0	3
4	1	0

a **i** How many cars were surveyed outside the school?

ii How many cars were surveyed on the motorway?

b **i** What is the modal number of passengers in cars outside the school?

ii What was the mode for cars surveyed on the motorway?

c **i** Jo starts to write out the number of passengers in each car outside the school:

0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, ...

She says the median number of passengers in cars outside the school is 1.

Explain how you know this from the table.

ii What is the median number of passengers in cars on the motorway?

d **i** Lee says that the total number of passengers in the cars on the motorway is

$(0 \times 31) + (1 \times 11) + (2 \times 5) + (3 \times 3) + (4 \times 0) = 0 + 11 + 10 + 9 + 0 = 30$

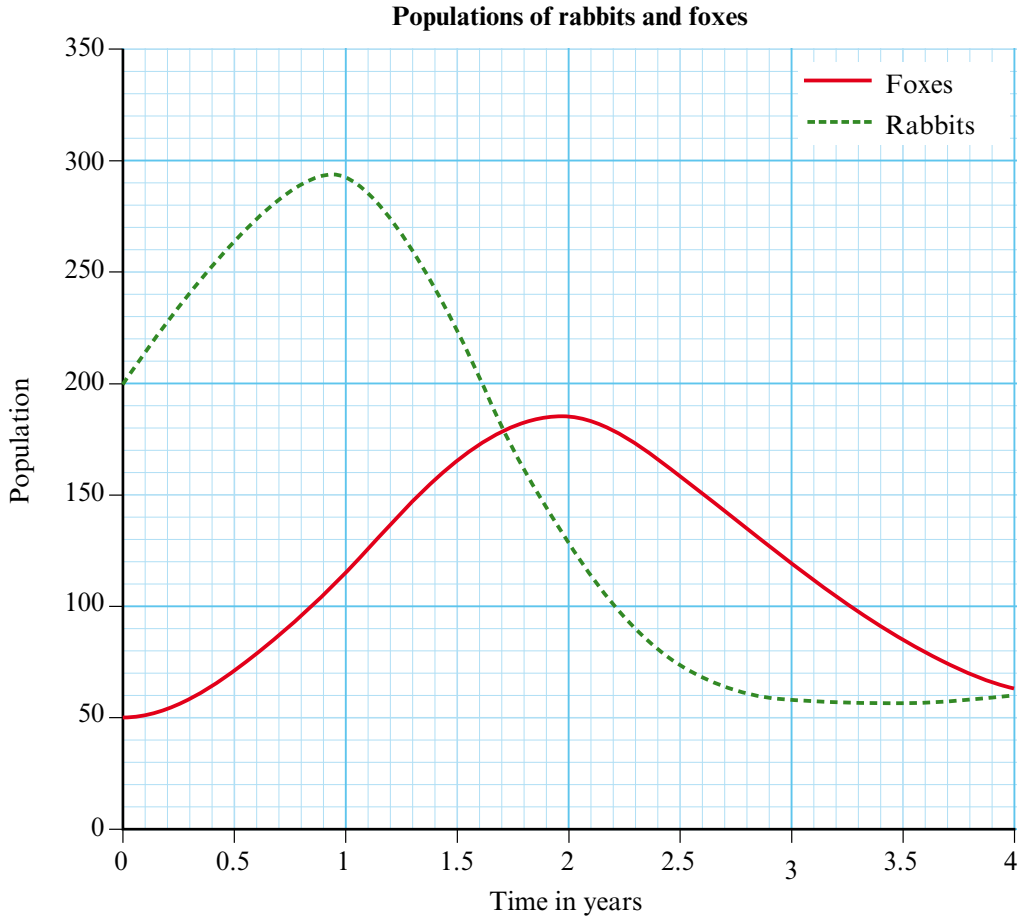
Explain why Lee is right.

ii Calculate the mean number of passengers in cars on the motorway.

iii Use Lee's method to calculate the mean number of passengers in cars outside the school.

e Stan says that the total number of passengers in the cars surveyed on the motorway was greater than the number of passengers in the survey outside the school. So cars on the motorway on average carry more passengers. Explain why Stan is wrong.

5 The graph shows how the population of rabbits and foxes on an island changes over a period of 4 years.



a How many foxes and rabbits were there at the start?

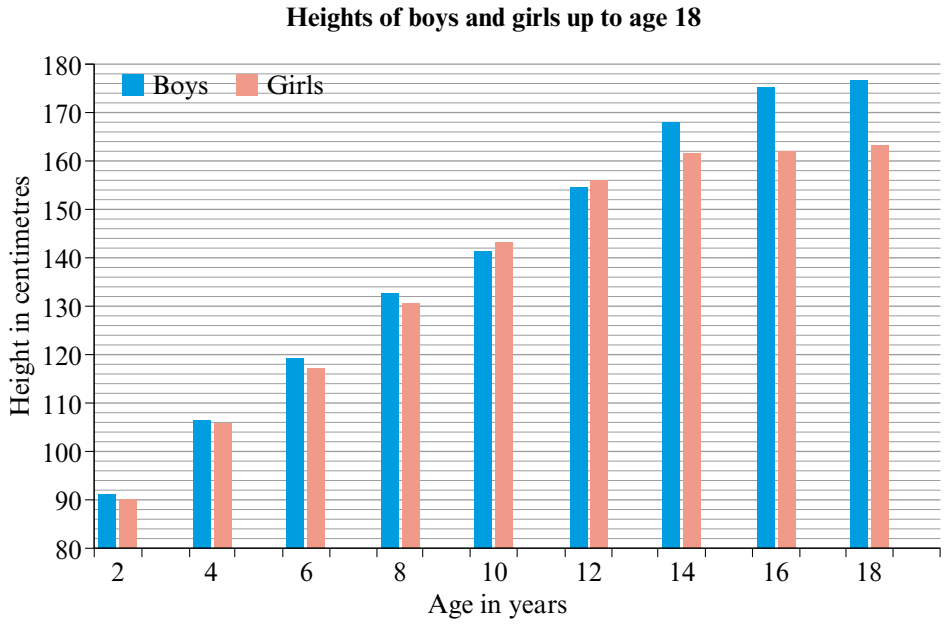
b Approximately how many foxes and rabbits were there at the end of 4 years?

c Was the range of the number of foxes greater or less than the range of the number of rabbits?

d Did rabbits and foxes ever have the same population? If so, when?

e Describe how the populations of rabbits and foxes changed.
Suggest reasons why they changed like this.
(Foxes need to eat rabbits to stay alive.)

6 This bar chart shows the mean heights of boys and girls every two years for 18 years.



a At age 18, are girls taller or shorter than boys, on average?

b At what ages are girls taller than boys?

c At age 5, the average height of both boys and girls is 113 cm.

Do you think that there is any other age at which boys and girls are the same height, on average? Explain your answer.

d **i** Approximately how much taller is a 4-year-old boy than a 4-year-old girl?

ii Approximately how much taller is a 14-year-old girl than a 12-year-old girl?

e **i** Between what ages do girls grow most slowly?

ii Between what ages do girls grow most quickly?

f Are the answers to part **e** the same for boys?

g Briefly describe the similarities and differences between the data for boys and girls.