Working with data

- Finding the mean, median and mode
- Finding the range

Keywords

You should know

explanation 1 online

1 Find the mode of each set of data.

a 7, 11, 10, 7, 9, 10, 7, 12, 9

b 18, 24, 21, 20, 23, 21, 18, 21, 22

c 5 m, 3 m, 4 m, 6 m, 3 m, 6 m, 8 m, 6 m, 5 m, 6 m, 8 m, 3 m, 5 m, 6 m, 7 m

d red, blue, yellow, blue, yellow, green, blue, red, blue, yellow, red, blue, white

e bus, car, car, walk, bus, car, bus, walk, walk, bus, car, cycle, car, walk, cycle

2 There are 31 pupils in class 7N. The table below shows the number of absences recorded for the class in one week.

Number of absences	0	1	2	3	4
Number of pupils	24	3	2	0	

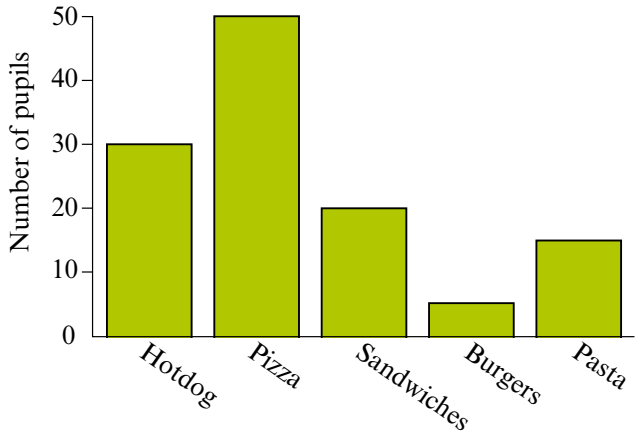
a How many pupils were absent on four occasions?

b What is the modal number of absences?

3 This bar chart shows the results of a survey of pupils' favourite school dinners.

a How many pupils took part in the survey?

b What is the mode?



4 The results of two traffic surveys of 100 vehicles are shown in the tables below.

One survey involved early morning motorway traffic on a weekday.

The other survey involved vehicles approaching the Dover ferry on a Saturday.

Table 1

Number of people in vehicle	1	2	3	4	More than 4
Number of vehicles	12	28	35		11

Table 2

Number of people in vehicle	1	2	3	4	More than 4
Number of vehicles		21	15	5	3

a Find the missing value in each table.

b What is the mode for each survey?

c Which survey do you think Table 1 represents? Explain how you made your decision.

5 This set of data has two modal values. Find them.

52, 49, 55, 51, 52, 51, 49, 57, 55, 53, 57, 52, 49, 55, 56, 49, 54, 55, 51

explanation 2 — online

6 The pulse rates of 60 pupils are shown below.

65	48	79	76	53	91	64	93	87	89	74	58
69	83	75	59	48	76	78	69	82	93	68	57
49	62	70	75	74	92	65	79	84	77	92	75
54	71	68	73	58	76	57	90	68	89	70	56
87	75	51	61	55	70	77	63	75	78	86	70

a Copy and complete the frequency table.

Pulse rate	41–50	51–60	61–70	71–80	81–90	91–100
Tally						
Frequency						

b Which is the modal class?

c What percentage of the pupils are in the modal class?

7 **a** Find the mode of this set of numbers.

18, 15, 20, 16, 15, 20, 18, 16, 20

b Do you think that the mode is typical of the data in this case? Explain your answer.

c Choose a value that you think is more typical of the data.

Describe how you made your choice.

8 These are the times in minutes that seven people waited at a doctor's surgery.

1 5 6 7 10 11 15

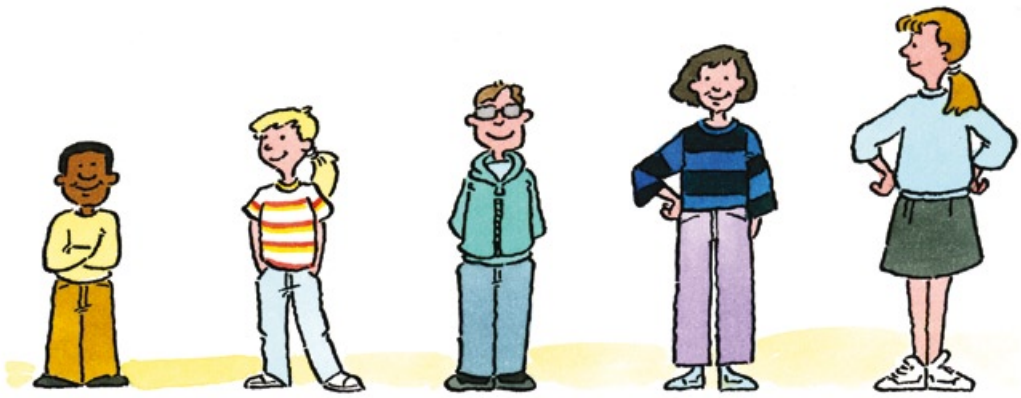
a Explain why the mode is not a suitable average in this case.

b Choose a value that you think is typical of the data.

Describe how you made your choice.

explanation 3 online

9



1.38 m 1.41 m 1.45 m 1.49 m 1.52 m

What is the median height of this group of friends?

10 Find the median of each set of numbers.

a 4 4 4 5 6 6 7 8 8

b 7.2 7.5 7.5 7.6 7.6 7.8 7.8 7.8 7.9 7.9 7.9

c 16 16 17 18 18 18 19 19

d 21 23 24 27 29 29 30 30

e 9 9 10 10 10 11 11 12 12 12

Remember to put the data in order of size first.

11 Find the median of each set of numbers.

a 32 37 28 31 33 29 33 37 32

b 24 19 25 23 25 20 26 19 27 23 24

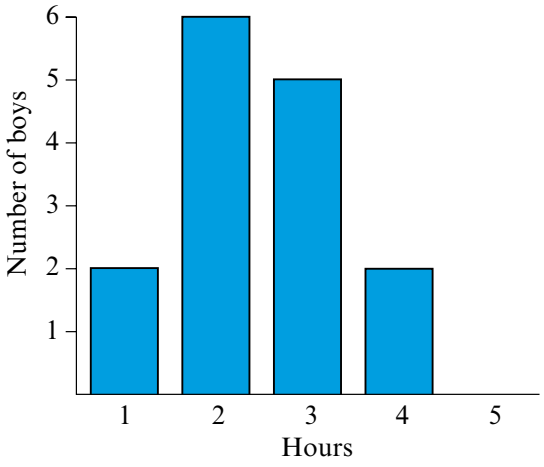
c 1.6 1.4 1.2 0.9 1.3 1.2 1.4 1.5 1.3 1.2 1.0 0.9 1.1

d 53 47 55 48 59 56 49 50 47 54

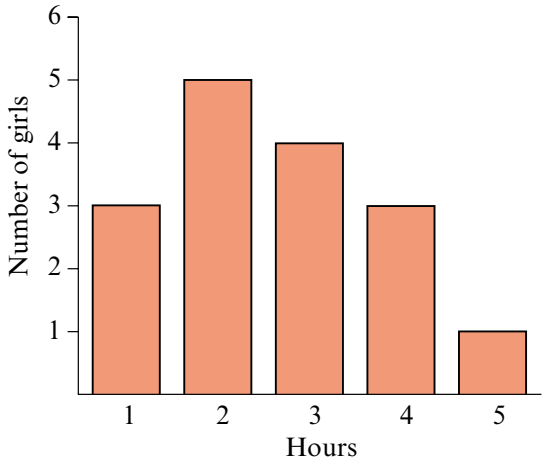
e 2.5 2 2.7 2.7 2.9 2.5 2.6 2.8 2.5 2.78

12 The pupils in one class said how much time they spend on homework each week. The results are shown in the bar charts below.

Homework times (boys)



Homework times (girls)



a Use the boys chart to list their times in order.

b Find the median time that the boys spend on homework.

c Use the girls chart to list their times in order.

d Find the median time that the girls spend on homework.

13 **a** Write down the value of the median for this set of numbers.

3 6 9 10 24 48 96

b Do you think that the median is typical of the data in this case? Explain your answer.

c What happens to the median if the 48 is replaced with 76?

d Explain why the mode cannot be used here.

explanation 4a | explanation 4b | online

14 Work out the mean of each set of numbers.

a 5 4 4 3 6 8

b 120 95 115

c 6.8 9.3 7.6 8.7 7.6

d 21 27 25 22 23 24 21 20 25 22

e 6 8 7 9 11 8 5 9 7 12

15 **a** Find the mean of this set of numbers.

7 9 3 4 6

b Find the new mean if the 3 is replaced by 4.

16 The mean of 10 numbers is 2.76.

What do the numbers add up to?

17 **a** Find the mean of this set of numbers.

1 3 6 2 0

b What is the new mean if each number is increased by 1?

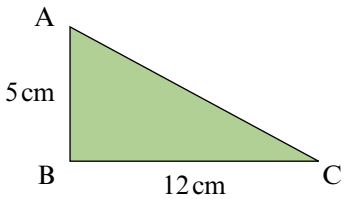
c What is the new mean if each number is doubled?

18 The mean of these numbers is 4.

3.8 2.7 $\square$ 5.1 5.3

What is the value of the missing number?

19 The three sides of this triangle have a mean length of 10 cm.
Find the length of side AC.



20 Use a calculator to find the mean of each set of data.

Where necessary, round your answers to 1 decimal place.

a 47 63 58 49 65 72

b 14 12 17 21 18 19 13 20 16 15 18

c 18.3 cm 14.6 cm 13.9 cm 17.8 cm 19.3 cm 16.9 cm 14.8 cm

d 7.8 kg 4.3 kg 6.1 kg 7.2 kg 8.7 kg 9.8 kg 8.5 kg 6.7 kg

21 These are the prices of some studio apartments in Spain.

€140 000 €147 000 €138 000 €152 000 €164 000

Find the mean cost of these studio apartments to the nearest €1000.

22 The mean of 7 numbers is 12.8.

One of the numbers is removed. Find its value if:

a the mean is reduced to 11.7 **b** the mean is unchanged

c the mean increases to 12.9

explanation 5

23 The youth club football team played 12 matches last season.

The table shows the number of goals that they scored.

Goals scored per match G	Number of matches N	G × N
0	1	
1	4	
2	3	6
3	2	
4	2	
	Total =	Total =

a Copy the table and fill in the missing values.

b Copy and complete:

mean number of goals per match = $\frac{\text{total number of } \ldots}{\text{total number of } \ldots} = \frac{\square}{\square}$

24 Tickets for a theatre performance of The Lion King were sold at three prices. The table shows the number of tickets sold at each price for one performance.

Ticket price T	Number of tickets sold N	T × N
£28.50	396	
£38.50	180	
£48.50	164	
	Total =	Total =

a Copy the table and fill in the missing values.

b Calculate the mean price paid per ticket to the nearest penny.

Mean price paid per ticket = $\frac{\text{total cost of } \ldots}{\text{total number of } \ldots} = \frac{\square}{\square}$

25 Mr Brown keeps a record of the number of merit slips awarded to the pupils in his class for good work. This table shows the number of merits awarded in one day.

Merit slips awarded M	Number of pupils N	M × N
0	6	
1	4	
2	10	
3	7	
4	2	
	Total =	Total =

a How many pupils are there in Mr Brown's class?

b How many merit slips were awarded that day?

c Use a calculator to work out the mean number of merit slips per pupil to 1 decimal place.

d On the same day the previous week, the mean was 1.6 to 1 decimal place.

Did Mr Brown's class perform better or worse than the previous week?

e What if Mr Brown had only calculated the means to the nearest whole number?

26 Sophie threw a dice 100 times and recorded the scores. This table shows her results.

Score S	Frequency F	... × ...
1	11	
2	17	
3	18	
4	14	
5	19	
6		
	Total =	Total =

a How many 6s did Sophie throw?

b Copy and complete the table.

c Calculate Sophie's mean score per throw.

27 These are the hourly rates of pay for seven workers at a small company.

£6.80 £7.30 £6.20 £6.60 £6.20 £30 £6.90

a Work out the mean hourly rate.

b Do you think that the mean is a good average to use here? Explain your answer.

c Find the median and the mode. Which type of average is most typical of the data?

explanation 6 online

28 Find the range of each set of data.

a 24 32 31 19 21 25 20 29

b 4.7 4.8 3.6 5.1 4.7 3.8 5.4

c 9 cm 11 cm 6 cm 12 cm 14 cm 13 cm 10 cm

d 28.4 m^2 27.6 m^2 24.9 m^2 26.7 m^2 29.9 m^2

29 The tallest person in Luke's class has a height of 1.6 m.

The range of the heights is 0.18 m.

What is the height of the shortest person in Luke's class?

30 The range of these numbers is 5.4.

11.3 ☐ 12.7 9.1 13.6

What are the two possible values of the missing number?

31 The mode of these numbers is 9.2. What is their range?

9.7 9.8 9.2 9.8 ☐ 9.6 9.2

32 The range of these numbers is 11 and their median is 124.

124 132 ☐ 123 125

What is the missing number?

33 **a** Write down 5 numbers with a range of 0.5 and a median of 16.

b Copy and complete the following statements using the highlighted words below.

i If the range of a set of numbers is very small then ...

ii If the range of a set of numbers is large then ...

all of the numbers must be far apart

all of the numbers must be close together

not all of the numbers can be close together

34 Here are some numbers. 4 6 9 10 12

a Which one should you reduce by 2 to increase the range?

b Which one can you increase by 3 without affecting the median or the range?

c Which one should you reduce by 1 to make the mean, the median and the range have the same value?