



Charts, averages from tables and scatter graphs

Grades 4–9 About 85 minutes

Calculator allowed 84 marks

Name _____

Class _____

Date _____

A Before you start

Grades 4–5

You will need these in every question below.

A1 Work out the mean of 4, 7, 9, 12 and 13.

[2 marks]

Answer

A2 Work out the median of 8, 3, 11, 6, 9 and 14.

[2 marks]

Answer

A3 Write down the mode and the range of 5, 9, 2, 9, 7 and 4.

[2 marks]

Answer mode range

A4 A pie chart is drawn for 72 people. What angle stands for one person?

[1 mark]

Answer

Your teacher works through each example with you. Then try the one beside it on your own.

EXAMPLE 1

30 students said how many pets they own: 6 own none, 11 own 1, 8 own 2 and 5 own 3. Work out the mean number of pets.

Hint Multiply each number of pets by its frequency and add the results. Divide by the total frequency, not by the number of rows.

B1 The table shows the number of goals scored in 25 football matches. Work out the mean number of goals. [3 marks]

Goals	Frequency
0	4
1	9
2	7
3	3
4	2

Answer

EXAMPLE 2

30 people waited for a bus. 5 waited up to 10 minutes, 12 waited more than 10 and up to 20 minutes, 8 waited more than 20 and up to 30 minutes, and 5 waited more than 30 and up to 40 minutes. Work out an estimate of the mean waiting time.

Hint You do not know the exact times, so use the midpoint of each class. That is why the answer is only an estimate.

B2 The table shows the masses, m kg, of 30 parcels. Work out an estimate of the mean mass. [3 marks]

Mass, m (kg)	Frequency
$40 < m \leq 50$	4
$50 < m \leq 60$	9
$60 < m \leq 70$	12
$70 < m \leq 80$	5

Answer

EXAMPLE 3

120 students chose their favourite sport: 45 chose football, 25 chose tennis, 30 chose swimming and 20 chose another sport. Work out the angle for each sector of a pie chart.

Hint The whole circle is 360° for 120 students, so each student gets $360 \div 120 = 3^\circ$.

- B3** 90 people said how they travel to work: 36 by bus, 27 by car, 18 walk and 9 cycle. Work out the angle for each sector of a pie chart. [2 marks]

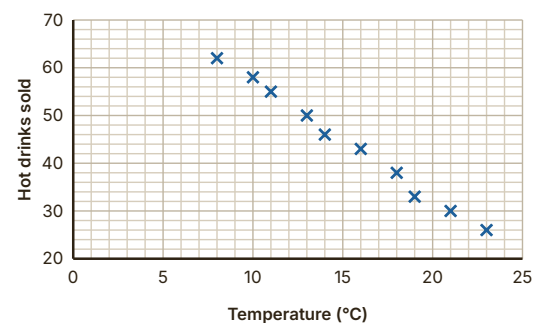
Answer

EXAMPLE 4

8 students recorded the hours they spent revising and their test marks: (1, 30), (2, 38), (3, 41), (4, 50), (5, 52), (6, 61), (7, 63) and (8, 72). Plot the points on a scatter graph and describe the correlation. Then draw a line of best fit and use it to estimate the mark of a student who revised for 4.5 hours.

Hint A line of best fit follows the trend with about as many points above it as below it. Read up from 4.5 on the horizontal axis to the line, then across.

- B4** The scatter graph shows the maximum temperature on 10 days and the number of hot drinks a café sold. [2 marks]



- (a) Describe the correlation. [1 mark]

Answer

- (b) Draw a line of best fit. Use it to estimate the number of hot drinks sold on a day with a maximum temperature of 15 °C. [2 marks]

Answer

Total for B4: 3 marks

Each question asks for something different. Show your working.

C1 The stem-and-leaf diagram shows the ages of 15 people at a meeting.

2	3	5	8		
3	0	1	4	4	7
4	2	2	2	6	9
5	1	5			

Key: 2 | 3 means 23 years

(a) Find the median age.

[1 mark]

Answer

(b) Find the range of the ages.

[1 mark]

Answer

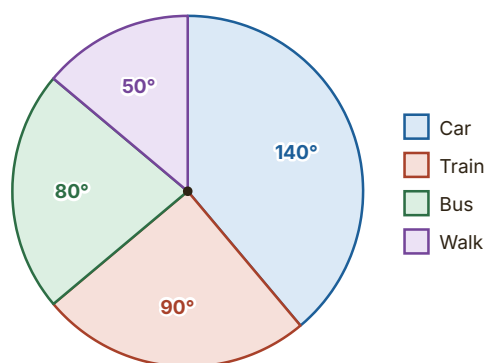
(c) What fraction of the people are older than 40?

[1 mark]

Answer

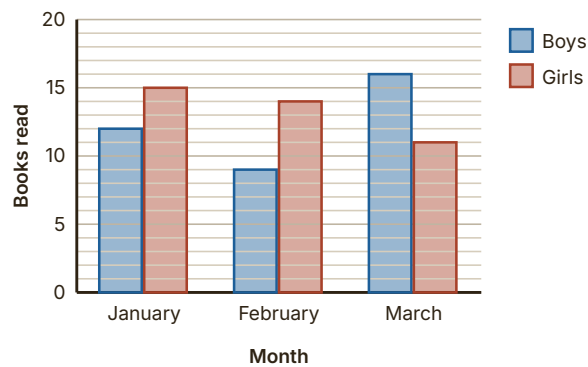
Total for C1: 3 marks

C2 The pie chart shows how 180 people travel to work. How many of them travel by train? [2 marks]



Answer

C3 The bar chart shows the number of books read by a group of boys and a group of girls in three months.



(a) In which month did the boys read more books than the girls? [1 mark]

Answer

(b) Work out the total number of books the girls read in the three months. [1 mark]

Answer

Total for C3: 2 marks

C4 The table shows the shoe sizes of 30 students.

Shoe size	Frequency
4	3
5	9
6	7
7	8
8	3

(a) Write down the mode. [1 mark]

Answer

(b) Work out the median. [2 marks]

Answer

Total for C4: 3 marks

C5

The table shows the heights, h cm, of 30 plants. Write down the modal class and the class that contains the median.

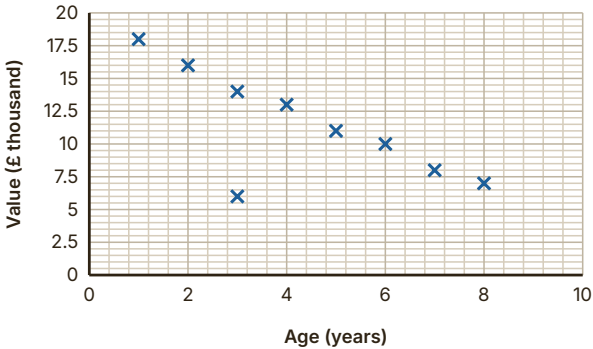
[2 marks]

Height, h (cm)	Frequency
$140 < h \leq 150$	4
$150 < h \leq 160$	11
$160 < h \leq 170$	9
$170 < h \leq 180$	6

Answer modal class median class

C6

The scatter graph shows the age and the value of 9 cars of the same model.



(a)

Describe the correlation.

[1 mark]

Answer

(b)

One car does not fit the pattern. Write down its age and its value.

[1 mark]

Answer

Total for C6: 2 marks

C7

The salaries of five people who work in a small office are £18 000, £19 000, £21 000, £22 000 and £95 000.

[2 marks]

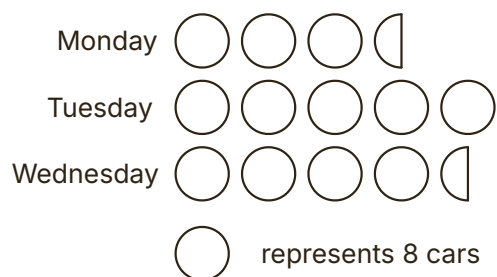
Which average gives the best idea of a typical salary? Give a reason, and work out that average.

Answer

- C8** Five whole numbers have a mean of 8. Four of the numbers are 3, 7, 9 and 13. Find the fifth number. [2 marks]

Answer

- C9** The pictogram shows the number of cars that used a car park on three days. [2 marks]
Work out the total number of cars on the three days.



Answer

D Exam-style questions

Grades 6–9

Answer every question in the space given. Show your working: most of the marks are for method.

- D1** The table shows the number of children in some families. The mean number of children is 1.5. [4 marks]

Work out the value of x .

Number of children	Frequency
0	5
1	x
2	10
3	4

Answer $x = \dots\dots$

- D2** Sam says, "More students walk to school in school B, because the walking sector in its pie chart is bigger." [3 marks]

School A has 600 students. In its pie chart, the sector for walking is 72° . School B has 300 students. In its pie chart, the sector for walking is 120° .

Explain why Sam is wrong.

- D3** The table shows the distances, d km, that 60 people travel to work.

Distance, d (km)	Frequency
$0 < d \leq 5$	14
$5 < d \leq 10$	22
$10 < d \leq 20$	18
$20 < d \leq 40$	6

- (a) Work out an estimate of the mean distance. Give your answer to 3 significant figures. [3 marks]

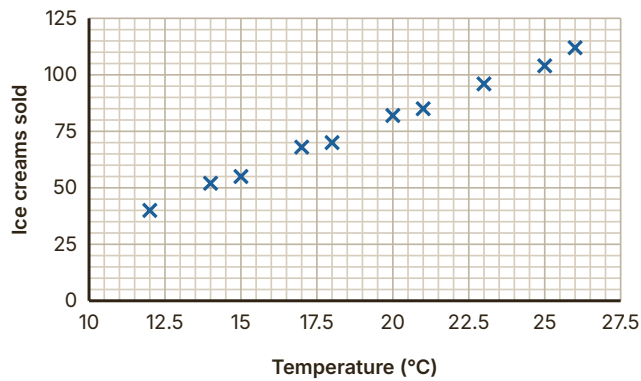
Answer

- (b) Explain why your answer to part (a) is only an estimate. [1 mark]

Answer

Total for D3: 4 marks

- D4** The scatter graph shows the midday temperature on 10 days and the number of ice creams a shop sold.



- (a) Describe the relationship between the temperature and the number of ice creams sold. [1 mark]

Answer

- (b) Draw a line of best fit. Use it to estimate the number of ice creams sold on a day with a midday temperature of 22 °C. [2 marks]

Answer

- (c) Explain why it would not be sensible to use your line to estimate the sales on a day at 40 °C. [1 mark]

Answer

Total for D4: 4 marks

- D5** 15 students in class A took a test. Their marks are shown in the stem-and-leaf diagram.
In class B, the median mark was 62 and the range was 28.

3		8
4		2 5 9
5		0 3 3 7
6		1 4 6 8
7		0 2 5

Key: 4 | 2 means 42 marks

- (a) Find the median mark for class A. [2 marks]

Answer

- (b) Find the range of the marks for class A. [1 mark]

Answer

- (c) Compare the marks of the two classes. [2 marks]

- (d) What fraction of class A scored more than 60? [1 mark]

Answer

Total for D5: 6 marks

- D6** The mean height of the 12 players in a basketball squad is 1.82 m. A new player joins the squad. The mean height of the 13 players is now 1.83 m. [3 marks]

Work out the height of the new player.

Answer

- D7** A pie chart shows the favourite type of music of a group of people. The sector for rock music has an angle of 81° and stands for 27 people.

(a) How many people are in the group?

[2 marks]

Answer

(b) 38 people chose pop music. Work out the angle of the pop music sector.

[1 mark]

Answer

Total for D7: 3 marks

- D8** Five positive whole numbers have a mean of 12, a median of 13, a mode of 15 and a range of 9.

[4 marks]

Find the five numbers. You must show your working.

Answer

- D9** The table shows the ages, a years, of 40 people at a party. Estimate how many of the people are older than 35.

[2 marks]

Age, a (years)	Frequency
$20 < a \leq 30$	12
$30 < a \leq 40$	16
$40 < a \leq 50$	8
$50 < a \leq 60$	4

Answer

No route is given. Spend five minutes on a problem before you look at a hint. The hints are on the last page of the worksheet, and you can use one at a time.

- E1** Seven positive whole numbers have a mode of 3, a median of 5 and a mean of 6. [4 marks]
There is only one mode.

Find the largest possible range of the seven numbers.

Answer

- E2** There are 30 students in a class. The mean mark of the boys in a test is 60. The [3 marks]
mean mark of the girls is 72. The mean mark of the whole class is 67.2.

How many girls are in the class?

Answer

- E3** In a pie chart, the angle for apples is 20° more than the angle for bananas. 9 more [3 marks]
people chose apples than chose bananas.

How many people are shown in the pie chart?

Answer

- E4** Five points have x -values 2, 3, 5, 6 and 9, and y -values 12, 17, 26, 30 and 45. A line of best fit has a gradient of 4 and passes through the point whose coordinates are the mean of the x -values and the mean of the y -values. [3 marks]
- Use the line to estimate the value of y when $x = 7$.

Answer

F How did it go?

Colour one circle on each line.

	Not yet	Nearly	Yes
I can draw and read pictograms, bar charts, pie charts and stem-and-leaf diagrams.	☐	☐	☐
I can work out the mean, median, mode and range from a frequency table.	☐	☐	☐
I can estimate the mean from grouped data and find the modal class.	☐	☐	☐
I can describe correlation, draw a line of best fit and say when an estimate from it can be trusted.	☐	☐	☐

Extension hints

Use one hint at a time. Cover the ones below it with a sheet of paper.

-
- E1**
- Hint 1** Write the seven numbers in order. The total is $7 \times 6 = 42$. To make the range large, make the smallest number small and the largest number big.
- Hint 2** 3 must appear more often than any other number, so it appears at least twice, below the median. The smallest number can then be 1: 1, 3, 3, 5, ...
- Hint 3** The numbers above the median must all be different, so they are at least 6 and 7. Then $1 + 3 + 3 + 5 + 6 + 7 + g = 42$ gives $g = 17$. The range is $17 - 1 = 16$.
-
- E2**
- Hint 1** Call the number of girls g . Then there are $30 - g$ boys.
- Hint 2** The total of all the marks is $30 \times 67.2 = 2016$, and it is also $60(30 - g) + 72g$.
- Hint 3** $1800 + 12g = 2016$, so $12g = 216$ and $g = 18$.
-
- E3**
- Hint 1** The difference in the angles stands for the difference in the numbers of people.
- Hint 2** 20° stands for 9 people.
- Hint 3** The whole circle is 360° , which is $18 \times 20^\circ$. So the number of people is $18 \times 9 = 162$.
-
- E4**
- Hint 1** Work out the mean of the x -values and the mean of the y -values.
- Hint 2** The means are 5 and 26, so the line passes through (5, 26).
- Hint 3** From $x = 5$ to $x = 7$ is 2 across, so the line goes up $2 \times 4 = 8$. The estimate is $26 + 8 = 34$.