

GCSE MATHS

Data, charts and averages

Long workbook

Questions on GCSE Maths topics, including challenges beyond typical exam questions.

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Topic recap

Types of data

Categorical data describe groups, such as colours. Discrete numerical data are counted; continuous data are measured.

Charts

Use separate bars for categories. In a pie chart, a sector angle is the category fraction times 360° . Time-series points follow time order.

Averages

Mean = total divided by number of values. Put values in order for the median. The mode is the most frequent value; the range is largest minus smallest.

Grouped data

For an estimated mean, multiply each class midpoint by its frequency. Add these products and divide by the total frequency.

A calculator may be used. Round non-exact decimal answers to 2 decimal places.

1. Data and frequency tables

Example Problem 1

**

Values 0, 1 and 2 have frequencies 3, 4 and 2. Find the total of all the data values.

The idea

1. Multiply each value by its frequency before adding.

Worked Solution

$$0(3) + 1(4) + 2(2) = 8$$

There are nine values, but their total is eight.

1 Data and frequency tables

**

Q1 Classify each type of data.

*

(a) Is eye colour categorical or numerical?**(b)** Is the number of siblings discrete or continuous?**(c)** Is the time taken to run a race discrete or continuous?**Q2** The table shows the numbers of books read by a group of pupils.

**

(a) How many pupils are represented?**(b)** Find the total number of books read.**(c)** Find the fraction of pupils who read at least 2 books.

Books read	0	1	2	3
Frequency	2	5	4	1

2. Charts and time series

Example Problem 2

**

A pie chart represents 80 people. A sector is 135° . How many people does it represent?

The idea

1. Use the sector fraction of a full circle.

Worked Solution

$$\frac{135}{360}(80) = 30$$

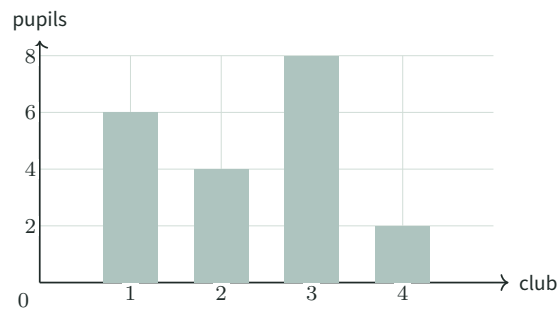
Multiply the fraction by the total population shown.

2 Charts and time series

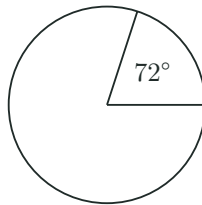
**

Q3 The bar chart shows four clubs. How many more pupils attend club 3 than club 4?

*

**Q4** A pie chart represents 120 pupils. A sector is 72° . How many pupils does it represent?

**

**Q5** In a survey, 18 of 60 people choose cycling. Find the cycling sector angle in a pie chart.

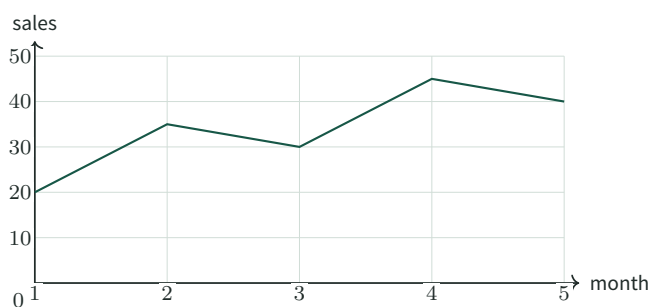
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Q6 The pictogram shows the number of people in a group. How many people are in the group?

**



- Q7** The time series shows monthly sales. Find the largest fall between consecutive months. Give every pair of months where it occurs. **



- Q8** Find the median of the values in the stem-and-leaf diagram. **

1	4	7
2	0	3 3 8

Key: 2 | 3 = 23

3. Averages and spread

Example Problem 3

**

Find the median and range of 8, 2, 11, 5 and 9.

The idea

1. Put the data in order; identify the middle and the extremes.

Worked Solution

2, 5, 8, 9, 11

Median = 8

range = $11 - 2 = 9$

Order the five values.

Read the middle; subtract the extremes.

3 Averages and spread

Q9 Find the mean of 4, 7, 8, 9 and 12.

*

Q10 Find the median of 13, 5, 9, 7, 11 and 3.

**

Q11 Find the mode of 2, 3, 3, 4, 5, 5, 5 and 8.

*

Q12 Temperatures are -4 , 2, -1 , 7 and 3°C . Find their range.

*

Q13 Four salaries are 20,000, 22,000, 24,000 and £150,000. Which is more representative of a typical salary here, mean or median? Explain.

**

Q14 Class A has median score 62 and range 18. Class B has median 58 and range 10. Compare the scores using both measures.

4. Missing values and grouped data

Example Problem 4

Six values have mean 10. A seventh value is 17. Find the new mean.

The idea

1. Convert the old mean to a total, add the new value, then divide by seven.

Worked Solution

$$6(10) + 17 = 77$$

Find the new total.

$$77/7 = 11$$

Divide by the new count.

4 Missing values and grouped data

★★★★

Q15 Five numbers have mean 12. Four of them are 8, 10, 13 and 14. Find the fifth.

★★★

Q16 Eight pupils have mean score 15. Two more pupils score 18 and 22. Find the new mean.

★★★

Q17 A group of 12 pupils has mean height 150 cm. Another group of 8 has mean height 160 cm. Find the combined mean.

★★★

Q18 Estimate the mean time from the grouped table.

Time t (minutes)	Frequency
$0 \leq t < 10$	3
$10 \leq t < 20$	5
$20 \leq t < 30$	2

Q19 Every value in a data set is multiplied by 3, then 5 is added. The original mean is 8 and range is 6. Find (a) the new mean; (b) the new range.

Q20 The mean of the values in this frequency table is 2.125. Find x .

Value	1	2	4
Frequency	3	x	2

Solving principles

1. Read the scale

Check axes, units and any pictogram key.

2. Use frequencies

A value with frequency five contributes five times to the total.

3. Explain a comparison

Compare typical values and spread separately.

4. Identify estimates

A mean calculated from class midpoints is an estimate because the individual data values are unknown.