GCSE Mathematics

Averages from Raw Data

Questions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation

Worked Examples

[Fluency]

Find the mean, median, mode and range of: 6, 3, 8, 3, 7, 2, 3

Sorted: 2, 3, 3, 3, 6, 7, 8

$$\text{Mean} = \frac{6+3+8+3+7+2+3}{7} = \frac{32}{7} \approx 4.6$$

Median = 4th value = **3** Mode = **3** Range = 8–2 = **6**

[Reasoning]

7 numbers have a mean of 8. Six of them are: 6, 10, 7, 9, 5, 11. Find the missing number.

$\text{Sum} = 7 \times 8 = 56$ $\text{Known sum} = 48$ $\text{Missing} = 56 - 48 = \mathbf{8}$

[Problem Solving]

Data set: 2, 2, 2, 3, 100. Which average best represents the data?

Mean = 21.8 (distorted by outlier 100)

Median = 2, Mode = 2 → **Median or mode** better represents typical value.

[Fluency]

1.

Value	4	7	2	9	3

Find the mean, median, mode and range of the data above.

(4 marks)

[Fluency]

2. Find the median of: 8, 3, 7, 1, 9, 5, 2

(2 marks)

[Fluency]

3. Find the mode of: 3, 7, 3, 9, 3, 7, 5

(1 mark)

[Fluency]

4. Find the range of: 12, 5, 18, 3, 15

(1 mark)

[Fluency]

5. Find the mean of: 15, 18, 22, 19, 16

(2 marks)

[Reasoning]

6.

A dataset contains these values: 2, 2, 2, 3, 100

(a) Find the mean, median and mode. (3)

(b) Which average best represents the data? Explain your answer. (2)

(5 marks)

[Reasoning]

7. 6 numbers have a mean of 8.

Five of the numbers are: 6, 10, 7, 9, 5.

Find the missing number.

(2 marks)

[Reasoning]

8.

Height (cm)	155	162	148	171	159

Find the mean and range of the heights above.

(3 marks)

[Problem Solving]

9. A student scores a mean of 72 marks across 5 tests.

After a 6th test, their mean increases to 74.

Find the score on the 6th test.

(3 marks)

[Problem Solving]

10. Classify each variable as **discrete**, **continuous** or **categorical**:

(a) Temperature (°C) (b) Shoe size (c) Goals scored (d) Favourite colour

(4 marks)

Section B — Higher

Worked Examples

[Fluency]

Five values are x, x+2, x+4, x+6, x+8. Their mean is 15. Find x.

$$\frac{5x+20}{5} = 15 \Rightarrow 5x + 20 = 75 \Rightarrow x = 11$$

Values: 11, 13, 15, 17, 19

[Reasoning]

Group A: n=20, mean=65. Group B: n=30, mean=72. Find the combined mean.

$$\bar{x} = \frac{20 \times 65 + 30 \times 72}{50} = \frac{1300 + 2160}{50} = \frac{3460}{50} = 69.2$$

[Problem Solving]

A dataset has mean 15 and n=8. A value of 20 is added. Find the new mean.

$$\bar{x}_{\text{new}} = \frac{15 \times 8 + 20}{9} = \frac{140}{9} \approx 15.6$$

[Fluency]

1. Five values are x, x+2, x+4, x+6, x+8.
Their mean is 15. Find x and state all five values.

(3 marks)

[Fluency]

2. Find the median of: 3, 5, 7, 9, 11, 13

(2 marks)

[Fluency]

3. A dataset has a mean of 15 and contains 8 values.
A 9th value of 20 is added.
Find the new mean. Give your answer as a fraction and as a decimal.

(3 marks)

[Reasoning]

4. An exam is marked out of 100. The coursework counts for 60% and the exam for 40%.
A student scores 68 in coursework and 72 in the exam.
Find the weighted mean mark.

(3 marks)

[Reasoning]

5. n numbers have a mean of m. One value, v, is removed.
Write an expression for the new mean in terms of n, m and v.

(3 marks)

[Reasoning]

6. Explain the difference between **primary** and **secondary** data.
Give one advantage of each.

(4 marks)

[Reasoning]

7. A dataset has values: 3, 5, 7, 9, 51.
(a) Find the mean, median and mode. (3)
(b) Which average is most affected by the outlier? Explain. (2)

(5 marks)

[Problem Solving]

8. Group A has 20 students with a mean mark of 65.
Group B has 30 students with a mean mark of 72.
Find the combined mean mark for all 50 students.

(3 marks)

[Problem Solving]

9. Find a set of 5 values with mean = 10, median = 9 and mode = 7.
Show your working clearly.

(4 marks)

[Problem Solving]

10. Prove that if two groups of sizes n■ and n■ have means x■■ and x■■,
then the combined mean is:

(3 marks)

$$\bar{x} = \frac{n_1\bar{x}_1 + n_2\bar{x}_2}{n_1 + n_2}$$