



KS3.M-S4 Averages: Mean, Median, Mode and Range

AQA KS3.M-S4 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Write down the mode of each list of numbers.

(a) List: 2, 5, 7, 5, 9 (1)

(b) List: 4, 4, 6, 6, 8, 10 (1)

2 Find the median of each list.

(a) List: 3, 1, 4, 2, 6 (1)

(b) List: 7, 3, 5, 9 (1)

3 Calculate the range for each set of scores.

(a) Set: 12, 5, 9, 21, 17 (1)

(b) Set: 8, 8, 8, 8, 8 (1)

4 Calculate the mean (average) for each complete list. Give answers to 1 decimal place if needed.

(a) List: 6, 9, 11, 4 (1)

(b) List: 5, 7, 6 (1)

5 A teacher recorded the number of books read by 5 pupils in a term: 2, 3, 8, 4, 13. Calculate the mean, median, mode and range of this data. Give the mean to 1 decimal place.

(a) Calculate the mean. (1)

(b) Calculate the median. (1)

(c) Calculate the mode and the range. (1)

6 Which average is most affected by an outlier? Choose one and give a short reason.

(a) Select mean, median or mode and give a reason. (2)

7 A set of exam scores is: 48, 52, 55, 60, 62, 95. Calculate the mean and median. Explain briefly how the 95 affects the mean compared to the median.

(a) Calculate the mean of the six scores. (1)

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(b) Calculate the median of the six scores. (1)

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(c) Explain briefly how the 95 affects the mean compared to the median. (1)

8 The number of minutes a group of 7 pupils spent on homework: 20, 35, 25, 40, 30, 35, 50. Calculate the mean, median and mode. Give the mean to 1 decimal place if needed.

(a) Calculate the mean. (1)

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(b) Calculate the median. (1)

.....

(c) Calculate the mode. (1)

.....

9 A small survey recorded the number of pets owned by 8 households: 0, 1, 2, 1, 3, 10, 2, 1. Calculate the mean, median and range. Comment on whether the mean or median is a better measure of a 'typical' number of pets for these households and why.

(a) Calculate the mean. (1)

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(b) Calculate the median. (1)

.....

(c) Calculate the range and state which average (mean or median) is better for a typical household here, with a short reason. (1)

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10 Complete the frequency table and then calculate the mean age of the group. Ages and frequencies: age 10 frequency 2; age 11 frequency 3; age 12 frequency 4; age 13 frequency 1. Give the mean to 1 decimal place.

(a) Find the total number of pupils. (1)

(b) Calculate the mean age. (3)

11 Two different classes took the same short test. Class A scores: 6, 7, 8, 7, 9. Class B scores: 2, 7, 8, 7, 12. For each class calculate the mean and median. Which class shows more variation in scores by comparing ranges? Give a short reason.

(a) Calculate the mean and median for Class A. (2)

(b) Calculate the mean and median for Class B. (2)

(c) Which class shows more variation by comparing ranges? Give a short reason. (0)

12 Stretch: A small club records the number of goals scored by its players in a season: 0, 1, 1, 2, 3, 3, 3, 20. (a) Calculate the mean and median. (b) The club manager says the mean is not a good measure of typical performance here. Do you agree? Give a short justification.

(a) Calculate the mean and the median. (2)

(b) The club manager says the mean is not a good measure of typical performance here. Do you agree? Give a short justification. (2)

Mark scheme · KS3.M-S4 Averages: Mean, Median, Mode and Range

Question 1

- (a) **B1** mode is 5 cao
- (a) Answer: **5**
- (b) **B1** both 4 and 6 stated as modes (bimodal) cao
- (b) Answer: **4 and 6**

Question 2

- (a) **B1** median is 3 cao
- (a) Answer: **3**
- (b) **B1** median is average of middle two: $(5+7)/2 = 6$ cao
- (b) Answer: **6**

Question 3

- (a) **B1** range is 16 cao
- (a) Answer: **16**
- (b) **B1** range is 0 cao
- (b) Answer: **0**

Question 4

- (a) **B1** mean 7.5 stated cao
- (a) Answer: **7.5**
- (b) **B1** mean 6 stated cao
- (b) Answer: **6**

Question 5

- (a) **B1** mean 6.0 stated cao
- (a) Answer: **6.0**
- (b) **B1** median 4 stated cao
- (b) Answer: **4**
- (c) **B1** mode none and range 11 stated (range = $13 - 2$) cao
- (c) Answer: **mode: none; range: 11**

Question 6

- (a) **M1** mean identified as the average affected by outliers
- (a) **A1** reason given: mean uses all values so a very large or small value pulls the average oe
- (a) Answer: **Mean; because the mean uses every value and a very large or small value pulls it away from the centre**

Question 7

- (a) **B1** mean 62 stated cao
- (a) Answer: **62**
- (b) **B1** median 57.5 stated cao
- (b) Answer: **57.5**
- (c) **B1** explanation that mean is pulled up by 95 while median less affected (mention mean uses all values or outlier increases mean) oe
- (c) Answer: **The 95 raises the mean because it is included in the total; the median is less affected as it depends on middle values which stay near 55 and 60**

Question 8

- (a) **B1** mean 33.6 stated to 1 d.p. cao
- (a) Answer: **33.6**
- (b) **B1** median 35 stated cao
- (b) Answer: **35**
- (c) **B1** mode 35 stated cao
- (c) Answer: **35**

Question 9

- (a) **B1** mean 2.5 stated cao
- (a) Answer: **2.5**
- (b) **B1** median 1.5 stated cao
- (b) Answer: **1.5**
- (c) **B1** range 10 and comment that median is better because the outlier 10 inflates the mean or median is less affected oe
- (c) Answer: **range: 10; median is better because the outlier 10 inflates the mean**

Question 10

- (a) **B1** total frequency 10 stated cao
- (a) Answer: **10**
- (b) **M1** correct method: sum of age x frequency = $10 \times 2 + 11 \times 3 + 12 \times 4 + 13 \times 1 = 20 + 33 + 48 + 13 = 114$ or equivalent
- (b) **M1** correct division by total frequency: $114/10$ oe
- (b) **A1** 11.4 to 1 d.p. cao
- (b) Answer: **11.4**

Question 11

- (a) **M1** correct sum or method for mean ($6+7+8+7+9 = 37$) oe
- (a) **A1** mean 7.4 and median 7 stated cao
- (a) Answer: **mean 7.4; median 7**
- (b) **M1** correct sum or method for mean ($2+7+8+7+12 = 36$) oe
- (b) **A1** mean 7.2 and median 7 stated cao
- (b) Answer: **mean 7.2; median 7**

Question 12

- (a) **M1** correct sum shown: $0+1+1+2+3+3+3+20 = 33$ or equivalent
- (a) **A1** mean 4.125 and median 2 stated (mean = $33/8 = 4.125$, median middle two 2 and 3 $\Rightarrow 2.5$? check) cao
- (a) Answer: **mean 4.125; median 2.5**
- (b) **M1** statement that mean is influenced by the outlier 20
- (b) **A1** justification that most players scored 0-3 so median 2.5 better represents typical performance (mention outlier skews mean) oe
- (b) Answer: **Yes. The mean (4.125) is pulled up by the single outlier 20, while the median 2.5 better reflects the scores of most players who scored between 0 and 3.**