Worksheet - Statistics: averages and grouped data

Year: Year 9 · 20

Show your working.

Question 1

Question 1 – Averages and range *(Section A · Skills practice)*

Find the mean, median, mode and range for each set of numbers. Put the numbers in order first.

a. $4, 7, 3, 7, 9$
b. $12, 15, 11, 18, 14, 10$
c. $2, 2, 5, 5, 8$ (the mode may have more than one value)
d. $6, 6, 6, 6, 6$

Question 2

Question 2 – Finding a missing value *(Section A · Skills practice)*

The total of all the values is the mean multiplied by the number of values. Use this to find the missing value.

a. The mean of 5 numbers is 8. Four of them are 6, 9, 7, 10. Find the fifth.
b. The mean of 4 numbers is 12. Three of them are 10, 15, 11. Find the fourth.
c. After 6 tests a pupil has a mean of 70%. After a seventh test the mean is 72%. Find the seventh score.
d. The median of 5 numbers is 9 and the numbers are $3, 6, 9, x, 15$. What can you say about x?

Question 3

Question 3 – Frequency table *(Section A · Skills practice)*

The table shows the number of goals scored by a team in 15 matches.

Goals	0	1	2	3	4
Frequency	3	5	4	2	1

a. Find the total number of goals.
b. Find the mean number of goals to 2 decimal places.
c. Find the mode and the median.
d. Find the range.

Question 4

Question 4 – Which average? *(Section A · Skills practice)*

Different situations need different averages. Choose mean, median or mode and explain your choice.

a. A shoe shop wants to know which size to stock most.
b. Six salaries in a firm are £22k, £24k, £25k, £26k, £27k and £250k. Which gives a fair average?
c. A teacher wants a fair average of a pupil's five test marks, all out of 100.
d. Find the mean and the median of the salaries in part (b).

Question 5

Question 5 – Grouped data *(Section A · Skills practice)*

The table shows how long 20 pupils spent on homework one evening.

Time t (minutes)	0	10	20
Frequency	6	9	5
Midpoint	5	15	25

a. Which is the modal class?
b. Estimate the mean time.
c. In which class is the median?
d. Why is the mean only an estimate?

Question 6

Question 6 – Comparing two sets *(Section A · Skills practice)*

Two teams play a number-based game. Team A scores a mean of 24 points with a range of 6. Team B scores a mean of 22 points with a range of 14.

a. Which team has the higher average score?
b. Which team is more consistent? Explain.
c. Write one sentence comparing the two teams using the mean and the range.
d. Team A improves by 5 points in every game. What happens to the mean and the range?

Question 7

Question 7 – The quiz scores *(Section B · Real-life practice)*

Ten pupils took a quiz marked out of 10. Their scores were $6, 8, 7, 9, 5, 8, 10, 7, 8, 6$.

a. Put the scores in order.
b. Find the mean, median, mode and range.

c. Mrs Khan says "most pupils scored higher than 7". Is that correct? Explain.
d. An eleventh pupil scores 10. Find the new mean and the new median.

Question 8

Question 8 – Pocket money *(Section B · Real-life practice)*

Eight pupils say how much pocket money (£) they get a week: $2, 5, 5, 3, 10, 4, 5, 20$.

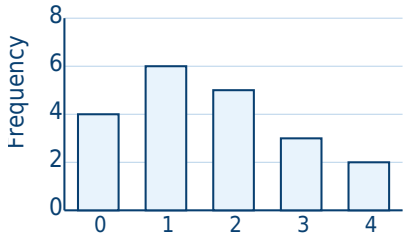
a. Find the mean, median and mode.
b. Which pupil's value is unusually large?
c. Find the mean without the largest value.
d. Which average best describes a typical pupil? Explain.

Question 9

Question 9 – Goals in the league *(Section B · Real-life practice)*

A hockey team scored the following numbers of goals in 20 matches.

Goals	0	1	2	3	4
Frequency	4	6	5	3	2



a. Find the total number of goals scored.
b. Find the mean number of goals per match.
c. Find the mode, median and range.
d. The coach wants a mean of at least 2 goals over 25 matches. How many goals must the team score in the next 5 matches?

Question 10

Question 10 – Daily temperatures *(Section B · Real-life practice)*

The midday temperatures (°C) one week in April were $12, 15, 14, 18, 17, 13, 16$.

a. Find the mean, median and range.
b. On Monday of the next week the temperature is 22°C. Find the new mean to 1 decimal place.
c. Does the median change? Find it.
d. Comment on whether 22°C is unusual.

Question 11

Question 11 – Waiting for the bus *(Section B · Real-life practice)*

Mr Singh recorded how long 30 passengers waited for a bus.

Wait t (min)	0	5	10	15
Frequency	8	14	6	2
Midpoint	2.5	7.5	12.5	17.5

a. Write the modal class.
b. Estimate the mean waiting time to 1 decimal place.
c. In which class is the median?
d. What fraction of passengers waited more than 10 minutes?

Question 12

Question 12 – Two classes *(Section B · Real-life practice)*

Class 9A and class 9B took the same maths test. 9A: mean 62%, range 40. 9B: mean 58%, range 18.

a. Which class has the higher mean?
b. Which class is more consistent? Explain.
c. The teacher says "9A is better than 9B". Give a reason for and against.
d. The lowest mark in 9B was 25%. Find the highest mark in 9B.

Question 13

Question 13 – Plant heights *(Section B · Real-life practice)*

A gardener measures the height in centimetres of seven plants: $12, 15, 15, 18, 20, 22, 15$.

a. Find the mean, median and mode.
b. Find the range.
c. One plant is replaced by one 30 cm tall instead of the 12 cm one. Find the new mean to 1 decimal place.
d. Compare how the mean, median and mode have changed.

Question 14

Question 14 – Shoe sizes in the shop *(Section B · Real-life practice)*

A shoe shop recorded the sizes of 37 pairs of children's shoes sold in a week.

Size	**4**	**5**	**6**	**7**	**8**	**9**
Frequency	3	7	12	8	5	2

a. Find the modal size.

b. Find the mean size to 1 decimal place.
c. Find the median size.
d. Which average should the shop use to decide how many of each size to order? Explain.

Question 15

Question 15 – Working backwards with the mean *(Section C · Problem solving)*

Use the idea that total = mean × number of values.

Situation	Given	Find
Ages of 4 friends	Mean 14	Mean of 5 is 15 with a new friend; his age?
8 numbers	Mean 6.5	Mean of the 7 left when one number 4 is removed?
5 test marks	Mean 15	Sixth mark if the mean becomes 16?

a. Answer each question.
b. Explain why the mean always lies between the smallest and largest values.
c. Four friends have mean age 14. Could the fifth friend's age make the mean 20? Find the age and say if it is realistic.

Question 16

Question 16 – Heights of Year 9 pupils *(Section C · Problem solving)*

The heights of 40 pupils were recorded.

Height h (cm)	$140 \leq h$	$150 \leq h$	$160 \leq h$	$170 \leq h$
Frequency	4	12	18	6
Midpoint	145	155	165	175

a. Write down the modal class.
b. Calculate an estimate of the mean height.
c. In which class does the median lie?
d. Estimate the number of pupils who are less than 160 cm tall, using the table directly.
e. The tallest pupil is 178 cm and the shortest is 142 cm. Find the greatest possible and actual range.

Question 17

Question 17 – Pizza delivery times *(Section C · Problem solving)*

Two pizza shops give summary statistics for delivery times in minutes.

	Mean	Median	Range

	Mean	Median	Range
Shop A	25	22	30
Shop B	27	26	10

a. Which shop is faster on average? Use the median and the mean.
b. Which shop is more reliable? Explain.
c. Your pizza must arrive within 30 minutes. Which shop would you choose and why?
d. Shop A's slowest delivery was 45 minutes. Find its fastest delivery.
e. What does the difference between mean 25 and median 22 for A tell you about its data?

Question 18

Question 18 – The missing frequency *(Section C · Problem solving)*

Fifteen pupils were asked how many brothers and sisters they have. Some results are in the table.

Number	0	1	2	3
Frequency	6	x	5	2

a. The mean number is 1.2. Write down the total number of pupils in terms of x.
b. Write the total number of brothers and sisters in terms of x.
c. Form an equation using the mean and solve it.
d. Find the mode and the median.
e. What is the total number of pupils?

Question 19

Question 19 – The marathon *(Section C · Problem solving)*

The times of nine runners in a 10 km race were (in minutes):
$40, 41, 43, 44, 45, 46, 48, 50, 60$.

a. Find the mean, median and range.
b. The slowest runner is disqualified. Find the new mean and median.
c. Which average changed more? Explain why.
d. Express the new mean in minutes and seconds.
e. The race organiser reports "typical time 45 minutes". Which average is that closest to?

Question 20

Question 20 – Challenge: combining groups *(Section D · Challenge)*

Class A has 20 pupils with a mean test mark of 62. Class B has 30 pupils with a mean

of 72.

a. Find the total marks for each class.
b. Find the mean mark for the two classes combined.
c. Explain why the combined mean is closer to 72 than to 62.
d. How many pupils with a mean of 80 must join class A so that its mean rises to 68?
e. A pupil in class B who scored 90 leaves. Find the new mean of B to 1 decimal place.