GCSE Maths: Averages from grouped frequency tables (Higher): answers

GCSE Maths - Statistics - Higher - Lesson 24.5

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at **websink.site/gcse/maths/ch24-statistics/higher/averages-from-grouped-frequency-tables/**

Exercise 24E Averages from grouped frequency tables

Calculator allowed

1 Write down the modal class from each table.

(a)

Class	Frequency
$0 < x \leq 10$	5
$10 < x \leq 20$	9
$20 < x \leq 30$	4
$30 < x \leq 40$	2

Answer: $10 < x \leq 20$

(b)

Class	Frequency
$10 < x \leq 20$	6
$20 < x \leq 30$	12
$30 < x \leq 40$	8
$40 < x \leq 50$	4

Answer: $20 < x \leq 30$

(c)

Class	Frequency
$100 < x \leq 120$	8
$120 < x \leq 140$	10
$140 < x \leq 160$	15
$160 < x \leq 180$	7

Answer: $140 < x \leq 160$

2 Write down the class that contains the median from each table.

(a)

Class	Frequency
$0 < x \leq 10$	5
$10 < x \leq 20$	9
$20 < x \leq 30$	4
$30 < x \leq 40$	2

Answer: $10 < x \leq 20$

(b)

Class	Frequency
$10 < x \leq 20$	6
$20 < x \leq 30$	12
$30 < x \leq 40$	8
$40 < x \leq 50$	4

Answer: $20 < x \leq 30$

(c)

Class	Frequency
$100 < x \leq 120$	8
$120 < x \leq 140$	10
$140 < x \leq 160$	15
$160 < x \leq 180$	7

Answer: $140 < x \leq 160$

3 Work out an estimate for the mean from each table. Give each answer to 1 decimal place where necessary.

(a)

Class	Frequency
$0 < x \leq 10$	5
$10 < x \leq 20$	9
$20 < x \leq 30$	4
$30 < x \leq 40$	2

Answer: 16.5

(b)

Class	Frequency
$10 < x \leq 20$	6
$20 < x \leq 30$	12
$30 < x \leq 40$	8
$40 < x \leq 50$	4

Answer: 28.3

(c)

Class	Frequency
$100 < x \leq 120$	8
$120 < x \leq 140$	10
$140 < x \leq 160$	15
$160 < x \leq 180$	7

Answer: 140.5

4 The table shows the times, in minutes, that 40 customers waited at a bank.

Waiting time	Frequency
$0 < t \leq 10$ min	3
$10 < t \leq 20$ min	8
$20 < t \leq 30$ min	14
$30 < t \leq 40$ min	10
$40 < t \leq 50$ min	5

(a) Write down the modal class. (b) Which class contains the median? (c) Work out an estimate for the mean waiting time.

(a) Modal class

Answer: $20 < t \leq 30$ min

(b) Median class

Answer: $20 < t \leq 30$ min

(c) Estimated mean

Answer: 26.5 min

5 The grouped table shows the number of goals scored by players in a season.

Goals	Frequency
0–4	6

5–9	9
10–14	7
15–19	3

Work out an estimate for the mean number of goals. Give your answer to 1 decimal place.

Answer: 8.4

6 The table shows the lengths of phone calls. The classes have different widths.

Length	Frequency
$0 < t \leq 10$ min	6
$10 < t \leq 30$ min	10
$30 < t \leq 60$ min	4

Work out an estimate of the mean length of a call.

Answer: 20.5 min

7 Ten people have ages 12, 18, 21, 25, 27, 31, 34, 36, 41, 45. (a) Work out the exact mean age. (b) Put the ages into the classes $10 \leq a < 20$, $20 \leq a < 30$, $30 \leq a < 40$ and $40 \leq a < 50$ and work out an estimate of the mean from the grouped table. (c) Compare your answers.

(a) Exact mean

Answer: 29

(b) Grouped table and estimated mean

Answer: 30

(c) Compare

Answer: The exact mean is 29 and the estimate is 30. They are close, but not equal.

8 Explain why you cannot work out the exact median or range from a grouped frequency table.

Answer: The exact values are not known; we only know which class each value is in.

9 The table shows the masses of 50 parcels.

Mass	Frequency
$0 < m \leq 20$ g	8
$20 < m \leq 40$ g	18
$40 < m \leq 60$ g	14
$60 < m \leq 80$ g	10

(a) Which class contains the median? (b) How many parcels weigh more than 40 g? (c) What percentage of the parcels weigh 20 g or less?

(a) Median class

Answer: $20 < m \leq 40$ g

(b) Parcels heavier than 40 g

Answer: 24

(c) Percentage 20 g or less

Answer: 16%

10 A grouped table has classes $0 < x \leq 20$, $20 < x \leq 40$ and $40 < x \leq 60$ with frequencies 8, 14 and 18. Work out an estimate for the mean.

Answer: 35.0

11 The estimated mean of a grouped table is 20. The table has two classes, $0 < x \leq 20$ with frequency 10 and $20 < x \leq 40$ with frequency f. Work out f.

Answer: 10

12 The table shows the times, in seconds, taken by 30 runners to complete a race.

Time	Frequency
$40 < t \leq 50$ s	3
$50 < t \leq 60$ s	9
$60 < t \leq 70$ s	12
$70 < t \leq 80$ s	6

(a) Write down the modal class. (b) Which class contains the median? (c) Work out an estimate for the mean time.

(a) Modal class

Answer: $60 < t \leq 70$ s

(b) Median class

Answer: $60 < t \leq 70$ s

(c) Estimated mean

Answer: 62 s

13 Use the estimated mean time of the 30 runners in the last question to estimate the total time taken by all 30 runners together.

Answer: 1860 seconds

14 Lee says: "If the classes in a grouped table are very narrow, then the mean from the table is exactly the true mean." Is Lee right? Explain.

Answer: No: it is still an estimate, although narrower classes make it closer to the true mean.

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