



H18-10min Percentiles and Interpercentile Range: 10-minute Pack

EDEXCEL 1ST0 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A speed camera recorded the speeds, in mph, of 200 cars on a stretch of road one day. The results are shown in the grouped frequency table.

Speed (s mph)	Frequency	Cumulative frequency
$20 < s \leq 30$	24	24
$30 < s \leq 40$	55	79
$40 < s \leq 50$	71	150
$50 < s \leq 60$	34	184
$60 < s \leq 70$	16	200

- (a) In a similar study last year, the 75th percentile of speeds was found to be 47 mph. (2)
Explain what this figure means.
- (b) Work out the position of the 40th percentile of this year's speeds within the cumulative frequency total. (2)
- (c) Write down the class interval that contains the 40th percentile. (1)

(Total for Question 1 is 5 marks)

2 A researcher is investigating the spread of annual income among self-employed workers in a region. Incomes in this population are known to be positively skewed, with a small number of very high earners.

- (a) **PLAN:** Suggest a suitable statistical measure of spread for summarising this data, other than the range, and give a reason for your choice. (2)
- (b) **COLLECT AND PROCESS:** The researcher takes a random sample of 250 self-employed workers and processes the incomes into a grouped frequency table with a cumulative frequency column. Explain why linear interpolation is needed to estimate a percentile from this table, rather than reading off an individual data value. (2)
- (c) **INTERPRET:** The researcher estimates the 10th percentile of incomes to be £14,500 and the 90th percentile to be £68,000. Calculate the 10-90 interpercentile range, and interpret this value in context. (2)

(Total for Question 2 is 6 marks)

Mark scheme · H18-10min Percentiles and Interpercentile Range: 10-minute Pack

Question 1

- (a) **B1** 75% of the cars in that study were travelling at 47 mph or below (oe)
- (a) **B1** equivalently, only 25% of cars were travelling faster than 47 mph (oe)
- **(a) Answer: 75% of cars were travelling at 47 mph or below (so only 25% were travelling faster than 47 mph).**
- (b) **M1** 0.4×200
- (b) **A1** 80 cao
- **(b) Answer: 80**
- (c) **B1** $40 < s \leq 50$ cao
- **(c) Answer: $40 < s \leq 50$**

Question 2

- (a) **B1** the (10-90) interpercentile range, or the interquartile range (oe)
- (a) **B1** because the distribution is skewed with some very high earners (potential outliers), and this measure ignores the extreme tails, so it is not distorted by them (oe)
- **(a) Answer: The 10-90 interpercentile range (or IQR), because it ignores the most extreme incomes at each end, so it is not distorted by the small number of very high earners.**
- (b) **B1** the incomes have been grouped into class intervals, so the exact individual values within each class are no longer known (oe)
- (b) **B1** linear interpolation estimates where a percentile falls within its class by assuming the data are evenly spread across that class (oe)
- **(b) Answer: Because the data are grouped, individual incomes within each class are unknown; linear interpolation estimates the percentile's position by assuming the incomes are evenly spread across the class.**
- (c) **B1** interdecile range = $68000 - 14500 = 53500$
- (c) **B1** the middle 80% of self-employed workers in the sample earn between £14,500 and £68,000 (a spread of £53,500), ignoring the lowest and highest 10% of earners (oe)
- **(c) Answer: £53,500 - the middle 80% of self-employed workers earn between £14,500 and £68,000.**