Marking guide | Statistics

Statistics topic test 2

10 questions | 40 marks | 65 minutes

A progressive original paper on investigation design, numerical summaries and evidence-based interpretation.

Equivalent correct methods earn the corresponding marks.

1. A council studies Sunday-opening preference among 2400 registered library users. [4 marks]

(a) Identify a population and an appropriate sample statistic. [2 marks]

A statistic describes the measured sample.

Answer: Population: 2400 users; statistic: the sample proportion preferring Sunday.

(b) Why sample rather than census? [2 marks]

Fewer people need to be contacted.

Answer: Sampling can reduce time and cost, while leaving uncertainty.

2. There are 900 users under 40, 1000 aged 40-64 and 500 aged 65 or above. [4 marks]

(a) Allocate a proportional stratified sample of 120. [2 marks]

Multiply each group fraction by 120.

Answer: 45, 50, 25 respectively.

(b) How should people be selected within each group? [2 marks]

Stratification alone is not random selection.

Answer: Randomly choose the allocated number of distinct eligible users.

3. Records include travel method, bus-route number, journey time and transfer count. [4 marks]

(a) Classify the first two. [2 marks]

Arithmetic on route codes has no numerical measurement meaning.

Answer: Both categorical; route number is an identifier.

(b) Classify the last two and give units where needed. [2 marks]

Measurements and counts have different value structures.

Answer: Time: continuous, for example minutes; transfers: discrete count.

4. Waiting times are 1, 2, 2, 3, 17 minutes. [4 marks]

(a) Find mean, median, range. [2 marks]

Total 25 divided by count 5; middle 2; $17 - 1 = 16$.

Answer: 5 min, 2 min, 16 min.

(b) Which centre is less affected by the long wait? [2 marks]

It uses ordered position rather than every value’s magnitude.

Answer: Median.

5. Values 1, 2, 3, 4 have frequencies 3, 5, 1, 1. [4 marks]

Value	1	2	3	4
Frequency	3	5	1	1

(a) Find weighted mean. [2 marks]

Weighted total 20; count 10.

Answer: 2.

(b) What percentage has value at least 3? [2 marks]

Two of 10 observations.

Answer: 20%.

6. Ordered values are 3, 5, 6, 8, 11, 13, 20. Exclude the median from each half. [4 marks]

(a) Find the five-number summary. [2 marks]

Median 8; half-medians 5 and 13.

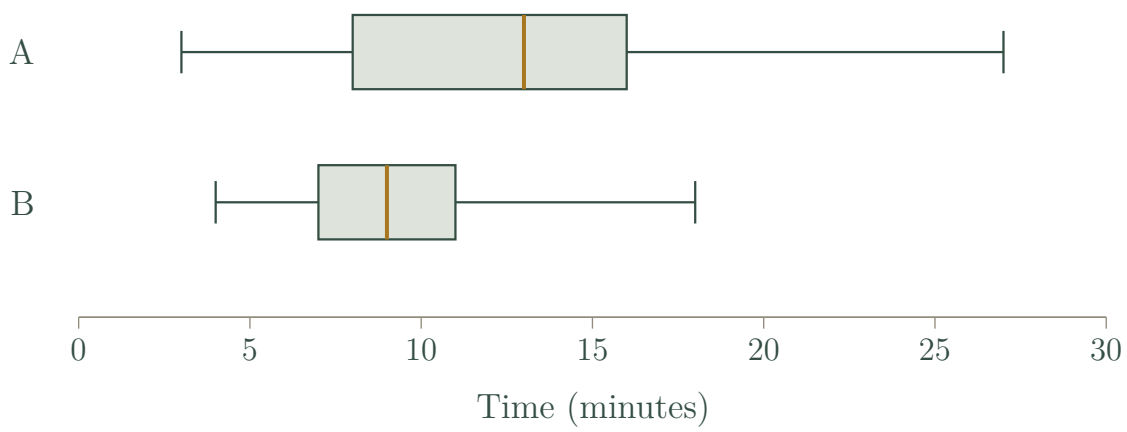
Answer: (3, 5, 8, 13, 20).

(b) Find IQR and upper fence. [2 marks]

$13 - 5 = 8;\ 13 + 1.5(8) = 25.$

Answer: IQR 8; upper fence 25.

7. Read the delivery-time box plots. [4 marks]



(a) Compare median and IQR. [2 marks]

Read median lines and box endpoints on the shared scale.

Answer: B median 9 vs 13 min; B IQR 4 vs 8 min.

(b) Name a feature not recoverable from these plots alone. [2 marks]

Box plots retain summaries, not all observations.

Answer: Exact sample size or all individual times.

8. A 12-person group averages 60; an 18-person group averages 70. [4 marks]

(a) Find combined mean. [2 marks]

Total $12(60) + 18(70) = 1980$; divide by 30.

Answer: 66.

(b) Why is 65 incorrect? [2 marks]

Weight individual observations equally, not the two groups.

Answer: It gives equal weight to unequal-sized groups.

9. A height of 250 cm appears among measurements near 170 cm. [4 marks]

(a) Describe two checks before changing it. [2 marks]

An unusual value can be genuine.

Answer: Check original units/record and whether the case fits the population.

(b) The source form confirms 150 cm. What now? [2 marks]

Use source evidence rather than a preferred summary.

Answer: Correct to 150 cm and document the transcription error.

10. Thirty-five café visits have median service 7 min and IQR 3 min, all from one quiet Tuesday. [4 marks]

(a) Write a conclusion supported by the data. [2 marks]

State the actual group, period and units.

Answer: Among those Tuesday visits, median service was 7 min and IQR 3 min.

(b) Give a limitation for weekends and an improvement. [2 marks]

The improvement addresses the coverage gap.

Answer: A quiet weekday may not represent weekends; sample comparable weekend periods.