Marking guide | Statistics

Statistics - Applications test

16 questions | 50 marks | 60 minutes

Use supplied school and community data to challenge claims and design defensible conclusions.

Equivalent correct methods earn the corresponding marks.

1. A museum surveys weekday morning visitors about evening opening. Name one group that may be under-represented. [2 marks]

They may especially value evening opening.

Use several collection times or a suitable broader frame.

Answer: People working or studying on weekday mornings.

2. A cycling club records route choice and travel time in minutes. Classify each variable. [2 marks]

A route name is a category.

Time is a measured numerical quantity.

Answer: Route choice:categorical. Travel time:numerical.

3. Cycle times are 12,14,15,15,19 minutes. Find mean, median and range. [3 marks]

(a) Calculate the mean. [1 mark]

$75/5 = 15$.

Answer: 15 min.

(b) Find the median and range. [2 marks]

Middle 15; $19 - 12 = 7$.

Answer: Median 15 min; range 7 min.

4. A random sample finds 27 of 45 residents support a cycle lane. Estimate support among 800 residents. [3 marks]

$27/45 = 0.6$.

$0.6 \times 800 = 480$, subject to sampling limits.

Answer: About 480 residents.

5. A random sample of 30 is taken from 900 students. A student calls it useless because it is not a census. Give a balanced response. [2 marks]

A census is not the only way to learn about a population.

Selection, response quality and size all affect usefulness.

Answer: A small random sample can provide useful evidence, but its estimates may vary and require caution.

6. The table shows extra practice sessions per week. Calculate mean and median. [4 marks]

Sessions	Frequency
0	5
1	8
2	5
3	2

(a) Calculate the mean. [2 marks]

Weighted total 24; total frequency 20.

Answer: 1.2 sessions.

(b) Find the median. [2 marks]

The tenth and eleventh observations are 1.

Answer: 1 session.

7. Compare A: 12,13,14,16,17 and B: 11,14,15,16,19 using median and range. [4 marks]

Use third ordered values.

Ranges $17 - 12 = 5$ and $19 - 11 = 8$. The samples overlap.

Answer: A median 14/range 5; B median 15/range 8. B has a higher middle and more spread in these samples.

8. The ordered values are 14, 15, a two-digit number with tens digit 1 and units digit x, 20, 22. The median is 18. Find x. [3 marks]

The third of five ordered observations is the median.

The missing value is 18, so its units digit is 8.

Answer: $x = 8$.

9. Ticket sales rise from 120 to 132. A graph starts its vertical axis at 100. Calculate the actual percentage increase. [3 marks]

Increase 12.

$12/120 \times 100 = 10\%$; do not use truncated bar heights as a ratio.

Answer: 10%.

10. Service A has 12 complaints from 300 orders. B has 10 from 200. A claim says B is better because 10 is less than 12. Assess it. [3 marks]

$12/300 = 4\%$; $10/200 = 5\%$.

Order totals differ, so compare proportions.

Answer: The raw-count argument misleads. A has the lower complaint rate: 4% versus 5%.

11. One sample has 18 supporters out of 40; another has 25 out of 50. Find both percentages and their percentage-point difference. [3 marks]

$18/40 \times 100 = 45\%$.

$25/50 \times 100 = 50\%$; $50 - 45 = 5$.

Answer: 45% and 50%; difference 5 percentage points.

12. Eight journey times have mean 12 minutes. Two more times,20 and 24 minutes, are added. Find the new mean. [3 marks]

Original total $8 \times 12 = 96$.

New total $96 + 20 + 24 = 140$ for 10 observations, so mean 14.

Answer: 14 minutes.

13. Masses are 1.2,1.3,1.4,1.5,15 kg. The source confirms the last value should be 1.5 kg. Find the corrected mean and justify the change. [3 marks]

Corrected total $1.2 + 1.3 + 1.4 + 1.5 + 1.5 = 6.9$.

$6.9/5 = 1.38$kg. Document the source-confirmed correction.

Answer: 1.38 kg; a verified recording error is corrected.

14. A: 10,11,12,13,14. B: 10,10,12,14,14. Both means are 12 and ranges 4. Explain why the groups are not identical. [3 marks]

Equal means and ranges do not determine every observation.

A common-scale dot plot would reveal the difference.

Answer: Their frequencies differ: A has one of each value; B has two 10 s and two 14 s.

15. Give two justified improvements to a voluntary lunchtime survey about a quiet study room, keeping it practical and respectful. [3 marks]

Improve access and selection rather than only increasing numbers.

Reduce response pressure and avoid unnecessary personal information.

Answer: Randomly select from the full roll; offer different response times; use neutral wording; collect anonymous responses. Any two justified.

16. Waiting times before and after a queue change are supplied. Calculate each mean, median and range, then assess the claim that every visitor now waits less. [6 marks]

Different visitors were observed in the two samples.

Before(min)	After(min)
8	7
9	8
9	8
10	10
14	12

(a) Summarise the before sample using mean, median and range. [2 marks]

Total 50; middle 9; $14 - 8 = 6$.

Answer: Mean 10; median 9; range 6 min.

(b) Summarise the after sample the same way. [2 marks]

Total 45; middle 8; $12 - 7 = 5$.

Answer: Mean 9; median 8; range 5 min.

(c) Assess the claim that every visitor now waits less. [2 marks]

The smaller typical values describe samples, not every visitor.

Other conditions may differ.

Answer: Not established. The samples overlap and are unmatched.