Statistics and data analysis - Practice test 2

16 questions | 43 marks | 55 minutes

A progressive review of summaries, displays, paired data and fair conclusions.

Equivalent correct methods earn the corresponding marks.

1. A data set has 7 measurements with mean 12. Four sum to 46 and the other two known values are 10 and 15. Find the seventh. [3 marks]

Total $7\times12=84$.

$84-46-10-15=13$.

Answer: 13

2. Find median, Q1 and Q3 for 4, 6, 7, 9, 10, 13, 14, 17, 20 using median-of-halves. [2 marks]

Exclude the median.

Lower half 4, 6, 7, 9; upper 13, 14, 17, 20.

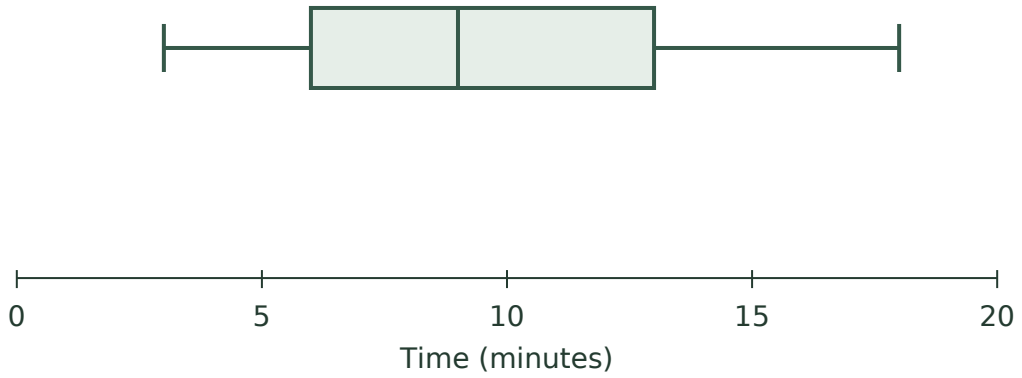
Answer: Median 10; Q1=6.5; Q3=15.5.

3. Find the range and IQR of the data in Question 2. [2 marks]

$20-4=16$; $15.5-6.5=9$.

Answer: Range 16; IQR 9.

4. Draw a labelled box plot for the five-number summary 3, 6, 9, 13, 18 minutes. [3 marks]



Choose a common linear scale.

Place the five summary values accurately.

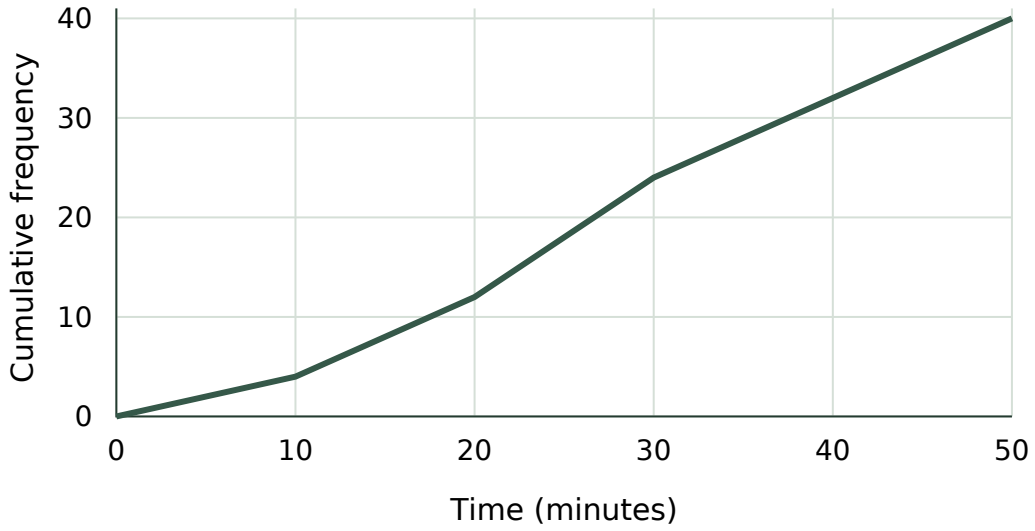
Answer: Whiskers 3 and 18, box 6 to 13, median 9.

5. An ordered sample has 25 values. Which nearest-rank position gives P90? [2 marks]

ceil(0.90×25)=ceil 22.5=23.

Answer: 23rd

6. Use the cumulative graph to estimate the 25th percentile. [3 marks]



25% of 40=10.

Between(10, 4)and(20, 12):10+(6/8)×10=17.5.

Answer: 17.5 minutes

7. Find the population variance and SD of 2, 2, 6, 6. [3 marks]

Mean 4; sum squared deviations 16.

Divide by 4, then square-root.

Answer: Variance 4; SD 2.

8. A sample has n=6 and squared-deviation total 45. Find its sample SD. [2 marks]

Sample variance 45/(6−1)=9.

SD 3.

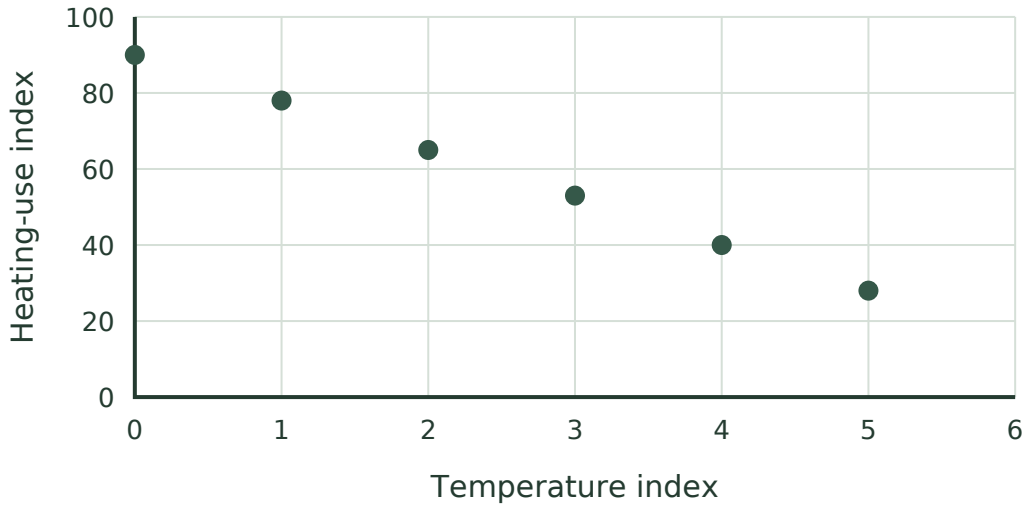
Answer: 3

9. Explain why SD has the original unit whereas variance has a squared unit. [2 marks]

Track the units through each operation.

Answer: Squaring deviations squares the unit; the final square root returns the original unit.

10. Describe the association shown in the plot. [3 marks]



As the horizontal variable rises, the vertical one falls.

Points remain close to a straight decreasing pattern.

Answer: Strong negative, approximately linear.

11. A scatterplot has a strong U-shaped pattern. Is 'no association' an adequate description? [2 marks]

No straight-line trend does not mean no pattern.

Answer: No; there is a strong nonlinear association.

12. A survey links more screen time with less sleep. Give one possible confounder and a cautious conclusion. [3 marks]

Identify another possible influence.

Keep the conclusion within the observational evidence.

Answer: Workload may affect both; screen time and sleep are associated in the sample, but causation is unproven.

13. Complete totals and find the percentage of cyclists who are inB. [4 marks]

Travel

Group	Cycle	Other
A	10	30
B	15	45

A 10+30=40; B 15+45=60.

15/25×100=60%.

Answer: Totals A 40, B 60, Cycle 25, Other 75, All 100; B is 60% of cyclists.

14. A class's mean rises after one very high score is added. Must the median also rise by the same amount? [2 marks]

Mean depends on the total.

Median depends on ordered middle positions.

Answer: No.

15. A headline says shoplifting fell 50%, from 2 cases to 1. State what is correct and what is missing. [3 marks]

(2−1)/2×100=50%.

Only one fewer case was recorded.

Answer: The 50% decrease is correct and means one fewer case; the period and population context are missing, and the small counts limit the claim.

16. Design a short investigation of height and arm span, stating population, sampling, measurement and a limitation. [4 marks]

Define target and sampling frame.

Standardise and preserve pairs.

State a specific generalisation limit.

Answer: Example: randomly sample Year 10 students, measure paired heights/arm spans in cm consistently, plot a scatterplot; one school may not represent other populations.