

Statistics and probability – supported focus

4MA1 supported native-lesson focus only; qualification gaps remain

1. Supported teaching and tier boundary

Supported teaching and tier boundary

4MA1: Statistics and probability. Version: Issue 2, November 2017; first assessment June 2018; linear Mathematics A.

2. Supported teaching and tier boundary

Supported teaching and tier boundary

Foundation teaching and Higher additions are labelled below. This reference packages the existing native-lesson crosswalk. It does not certify unreviewed specification rows or a whole qualification. Original diagnostics are separate and are not reproduced.

3. Centre, spread and data displays · Foundation

Centre, spread and data displays · Foundation

The mean is total divided by count. The median is the central value after sorting. The range is maximum minus minimum. Use frequency tables, bar charts and suitable comparisons.

4. Centre, spread and data displays · Foundation

Centre, spread and data displays · Foundation

$$\bar{x} = \frac{\sum x_i}{n}$$

5. Centre, spread and data displays · Foundation

Centre, spread and data displays · Foundation

For 2,4,4,6,9, total=25 and count=5, so mean=5. The central value is 4, so median=4. The range is $9-2=7$. Explain both a typical value and the spread.

6. Centre, spread and data displays · Foundation

Centre, spread and data displays · Foundation

The tallest histogram bar need not contain the most observations. A grouped mean is an estimate. Correlation does not prove causation, and extrapolation extends beyond the observed range.

7. Centre, spread and data displays · Foundation

Centre, spread and data displays · Foundation

A bar chart uses separate bars for categories. Unequal-class-width histograms and formal density calculations are outside this Foundation/Core lesson.

8. Data summaries, histograms and interpretation · Higher

Data summaries, histograms and interpretation · Higher

Compare an appropriate average and spread in context. A histogram uses area for frequency, so $\text{height} = \text{frequency} / \text{class width}$. Grouped estimates assume representative values within intervals.

9. Data summaries, histograms and interpretation · Higher

Data summaries, histograms and interpretation · Higher

$$\bar{x} = \frac{\sum x_i}{n}, \quad \text{density} = \frac{\text{frequency}}{\text{class width}}$$

10. Data summaries, histograms and interpretation · Higher

Data summaries, histograms and interpretation · Higher

A class from 10 to 20 with frequency 30 has density $30/10=3$. A class from 20 to 40 with frequency 20 has density $20/20=1$. Its wider bar must not be mistaken for a larger density. For values 2,4,4,6,9, the median is 4 and mean is 5.

11. Data summaries, histograms and interpretation · Higher

Data summaries, histograms and interpretation · Higher

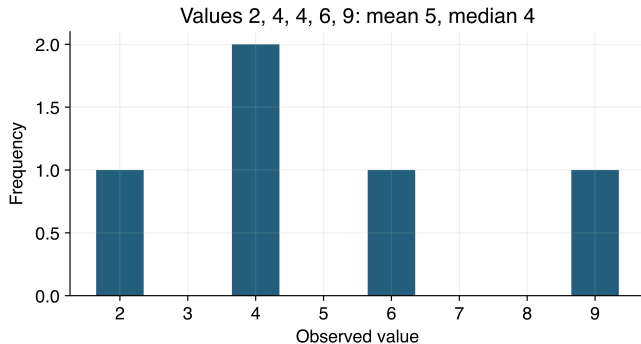
The tallest histogram bar need not contain the most observations. A grouped mean is an estimate. Correlation does not prove causation, and extrapolation extends beyond the observed range.

12. Data summaries, histograms and interpretation · Higher

Data summaries, histograms and interpretation · Higher

Choose a display that fits the data type. Give both a numerical comparison and what it means for the population; do not infer more precision than the sample supports.

Figure 13: Data summaries, histograms



Check the labelled values and conditions.

14. Probability trees and outcomes · Foundation

Probability trees and outcomes · Foundation

A probability lies between 0 and 1. Exhaustive, mutually exclusive outcomes have probabilities summing to 1. Multiply successive branch probabilities and add separate routes to an outcome.

15. Probability trees and outcomes · Foundation

Probability trees and outcomes · Foundation

$$P(RR) = P(R_1)P(R_2 \mid R_1)$$

16. Probability trees and outcomes · Foundation

Probability trees and outcomes · Foundation

A bag contains 3 red and 2 blue counters. With replacement, $P(\text{two red}) = 3/5 \times 3/5 = 9/25 = 0.36$. Without replacement, the red-red branch is $3/5 \times 2/4 = 0.3$. Label each branch before multiplying.

17. Probability trees and outcomes · Foundation

Probability trees and outcomes · Foundation

Mutually exclusive means no overlap; independent means that knowing one event does not change the other's probability. Two disjoint events with positive probability are not independent.

18. Probability trees and outcomes · Foundation

Probability trees and outcomes · Foundation

Use a frequency table or a simple tree before calculating. Formal conditional probability formulae are outside this Foundation/Core support lesson.

19. Probability, trees and conditional reasoning · Higher

Probability, trees and conditional reasoning · Higher

Multiply along a tree branch and add disjoint branches. With replacement, the composition stays fixed. Conditional probability is $P(A \text{ given } B) = P(A \cap B) / P(B)$, for $P(B) > 0$.

20. Probability, trees and conditional reasoning · Higher

Probability, trees and conditional reasoning · Higher

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}, \quad P(B) > 0$$

21. Probability, trees and conditional reasoning · Higher

Probability, trees and conditional reasoning · Higher

Without replacement, $P(\text{two red}) = \frac{3}{5} \times \frac{2}{4} = \frac{3}{10}$. $P(\text{one of each}) = \frac{3}{5} \times \frac{2}{4} + \frac{2}{5} \times \frac{3}{4} = \frac{3}{5}$. If $P(A \cap B) = 0.12$ and $P(B) = 0.3$, $P(A \text{ given } B) = 0.4$.

22. Probability, trees and conditional reasoning · Higher

Probability, trees and conditional reasoning · Higher

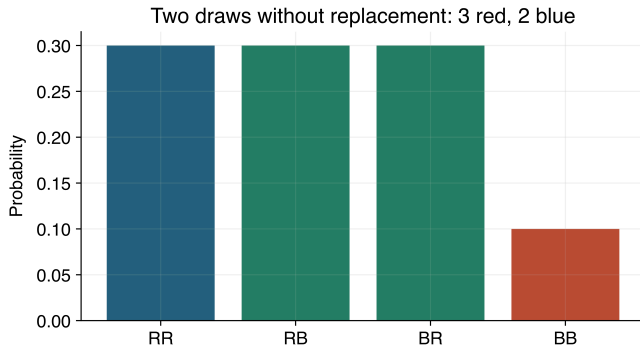
Mutually exclusive means no overlap; independent means that knowing one event does not change the other's probability. Two disjoint events with positive probability are not independent.

23. Probability, trees and conditional reasoning · Higher

Probability, trees and conditional reasoning · Higher

A two-way table makes the restricted denominator visible. Before using a product $P(A)P(B)$, justify independence from the context or the supplied information.

Figure 24: Probability, trees and conditional



Check the labelled values and conditions.

25. Cumulative frequency and box plots · Higher

Cumulative frequency and box plots · Higher

A cumulative frequency counts observations below successive class boundaries. Read quartiles at one quarter, one half and three quarters of the total frequency. A box plot represents minimum, lower quartile, median, upper quartile and maximum.

26. Cumulative frequency and box plots · Higher

Cumulative frequency and box plots · Higher

$$\text{IQR} = Q_3 - Q_1$$

27. Cumulative frequency and box plots · Higher

Cumulative frequency and box plots · Higher

For 80 observations, read Q_1 at cumulative frequency 20, median at 40 and Q_3 at 60. If $Q_1=12, Q_3=21$, then $IQR=9$. Compare the medians for typical journey time and the IQRs for consistency.

28. Cumulative frequency and box plots · Higher

Cumulative frequency and box plots · Higher

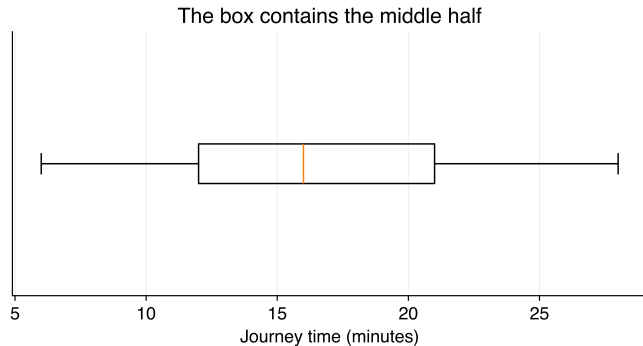
Plot against class boundaries rather than midpoints. Grouped quartiles are estimates. The range is sensitive to extremes; the IQR describes only the middle half.

29. Cumulative frequency and box plots · Higher

Cumulative frequency and box plots · Higher

Explain a comparison in the context of the measured quantity. An outlier rule may use $Q1 - 1.5IQR$ and $Q3 + 1.5IQR$; use the rule specified in the task rather than assuming every graph follows it.

Figure 30: Cumulative frequency and box plots



Check the labelled values and conditions.

31. Remaining qualification limits

Remaining qualification limits

Official question-bank boundaries, scheme alignment and all objective-level teaching coverage require the recorded review; no practice registry promotion.

32. Remaining qualification limits

Remaining qualification limits

The authored diagnostic assessments are not full-length qualification mocks.

33. Remaining qualification limits

Remaining qualification limits

Only the mapped native skills are supplied here. Objective rows marked formula-review-required are not promoted to complete coverage by these print companions.

34. Terms

Terms	
range	.

35. Terms

Terms

frequency density .

36. Terms

Terms

conditional probability .

37. Terms

Terms

interquartile range

.

Check yourself

Reconstruct the method without looking back

Decide whether this claim is true. Give a concrete calculation or counterexample: The mean of a list must always be one of its observed values.