



Cambridge International AS & A Level

CANDIDATE NAME



CENTRE NUMBER

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MATHEMATICS

9709/63

Paper 6 Probability & Statistics 2

May/June 2025

1 hour 15 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [].

This document has **12** pages. Any blank pages are indicated.



2 The lengths of pencils made at a factory are normally distributed. The standard deviation of the lengths is σ cm, and the mean is supposed to be 10 cm. An inspector thinks that the mean is actually greater than 10 cm. He takes a random sample of 50 pencils produced at the factory and finds that the mean of these 50 lengths is 10.03 cm. He then carries out a hypothesis test.

(a) He finds that the value of the test statistic z is 1.995 correct to 3 decimal places.

(i) Calculate the value of σ . [3]

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(ii) Carry out the hypothesis test at the 2.5% significance level. [3]

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(b) Explain whether it was necessary to use the Central Limit Theorem in carrying out the test. [1]

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- 3 A machine dispenses coffee into cups. The volume, $V \text{ cm}^3$, of coffee in a cup was measured for a random sample of 150 cups. The results were summarised as follows.

$$\sum v = 46350 \quad \sum v^2 = 14410800$$

- (a) (i) Calculate unbiased estimates of the population mean, μ , and population variance, σ^2 . [3]

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- (ii) Calculate a 95% confidence interval for μ . [3]

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Another random sample of n cups of coffee is taken, where $100 < n < 120$. A 95% confidence interval for μ is calculated using this sample. You may assume that, for large samples, unbiased estimates of σ^2 are very similar.

- (b) Without calculation, state whether this confidence interval would be wider or narrower than the confidence interval found in part (a)(ii). Give a reason for your answer. [2]

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