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CAMBRIDGE
International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3361507002

MATHEMATICS **9709/62**

Paper 6 Probability & Statistics 2 **February/March 2026**

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. Do **not** use correction fluid or tape.
- 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.

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1 The heights, H centimetres, of a random sample of 8 one-year-old plants of a certain variety were measured, with the following results.

104 96 110 122 96 101 99 113

(a) Calculate unbiased estimates of the population mean and variance of H. [3]

It is now given that the true value of the population variance is 85.0.

(b) Stating a necessary assumption, find a 99% confidence interval for the population mean of H, giving the limits of the interval correct to 1 decimal place. [4]

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2 Last year, the time, in minutes, spent by customers in a certain shop had mean 10.5 and standard deviation 6.8. This year, the shop owner wants to test whether the mean time spent by customers has changed. He decides to choose a sample of 20 customers.

(a) A shop assistant suggests that they should choose the first 20 customers who enter the shop one morning.

Give **two** reasons why this will **not** produce a random sample. [2]

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The shop owner decides to carry out the test at the 10% significance level. He chooses a random sample of 20 customers, and he finds that the mean time spent in the shop by these customers is 8.4 minutes. You should assume that these times come from a normal distribution.

(b) State an assumption that is necessary for the test. [1]

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(c) Carry out the test. [5]

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3 A shop sells two types of cell phone. Sales of the two types occur at constant average rates of 3.2 per week for one type and 2.9 per week for the other type. You may assume that sales occur at random and independently of one another.

(a) A week is chosen at random.

(i) Find the probability that the shop sells a total of 5 cell phones. [2]

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(ii) Find the probability that the shop sells exactly 5 phones of one type and none of the other type. [3]

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(b) **(i)** Use a suitable approximating distribution to find the probability that the shop sells a total of more than 30 cell phones in 6 randomly chosen weeks. [4]

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(ii) Justify your approximating distribution. [1]

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The weekly sales, X and Y, of two types of computer, have the distributions $X \sim \text{Po}(\lambda)$ and $Y \sim \text{Po}(\mu)$.

(c) Given that $\text{P}(X = 0) = 2\text{P}(Y = 1)$, find an expression for λ in terms of μ. [3]

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4 A firm sells cheese in packets. The mass of cheese in the packets is normally distributed with mean 1.12 kg and standard deviation 0.15 kg. The firm makes a profit of \$0.32 per kilogram of cheese sold.

Find the probability that the total profit made on 50 randomly chosen packets of cheese is less than \$18.00. [6]

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5 Anita has a dice with sides numbered 1, 2, 3, 4, 5, 6. The score on one throw is denoted by X.

(a) Assuming that the dice is fair, show that $\text{Var}(X) = \frac{35}{12}$. [2]

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Anita suspects that the dice is not fair. She thinks that low scores are more likely than high scores. She intends to throw the dice 50 times, and if the mean score is less than 3, she will conclude that the dice is not fair.

It is now given that the dice is not fair and $\text{E}(X) = 2.5$.

(b) Assuming that $\text{Var}(X) = \frac{35}{12}$, calculate the probability of a Type II error. You may assume that a continuity correction is **not** needed. [3]

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(c) State what is meant by a Type II error in this context. [1]

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(d) The sample mean score from Anita's 50 throws of the dice was 2.9.

Explain why it is **not** possible for Anita to make a Type II error. [1]

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6 The widths, Xcm, of the stones found on a certain beach are modelled by the probability density function given by

$$f(x) = \begin{cases} k(ax - x^2) & 0 < x < a, \\ 0 & \text{otherwise,} \end{cases}$$

where k and a are constants.

(a) Show that $k = \frac{6}{a^3}$. [3]

(b) Without calculation, give an expression for $E(X)$ in terms of a. [1]

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(c) **(i)** Find $P(X < \frac{1}{4}a)$, showing that this probability is independent of a. [3]

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(ii) Use your answer to **6(c)(i)** to find $P(\frac{1}{4}a < X < \frac{3}{4}a)$. [2]

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