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Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 3 5 5 6 0 3 4 7 4 6 *

MATHEMATICS **9709/62**

Paper 6 Probability & Statistics 2 **May/June 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 [ ].

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1 Ten random values of a variable X are given below.

8.1 8.3 9.5 10.1 7.9 8.7 9.1 8.8 9.4 9.0

Calculate unbiased estimates of the population mean and variance of X. [3]

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2 Each week, Birgitte takes three train journeys. The times, in minutes, for these journeys have the independent distributions $A \sim \mathrm{N}(28, 15)$, $B \sim \mathrm{N}(23, 8)$ and $C \sim \mathrm{N}(99, 24)$.

For a randomly chosen week, find $\mathrm{P}(C > 2(A+B))$. [5]

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3 The number of vehicles, X, passing a certain junction between 1.00 pm and 1.01 pm is modelled by a Poisson distribution. In the past, the population mean of X was 2.4. After a change is made to the junction, the value of X is noted on a randomly chosen day. A hypothesis test at the 5% significance level is carried out to determine whether the population mean of X has increased.

(a) State suitable null and alternative hypotheses for the test. [1]

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(b) Find the smallest value of X that would result in rejecting the null hypothesis. [4]

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(c) State the value of P(Type I error). [1]

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4 The random variables D and E have the independent distributions $D \sim \text{Po}(1.7)$ and $E \sim \text{Po}(2.1)$.

(a) Find $\text{P}(D+E<4)$. [3]

(b) Given that $D+E<4$, find $\text{P}(D=1)$. [3]

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(c) The random variable T is the total of 100 randomly chosen values of D.

Use the normal approximation to the Poisson distribution to find $P(T > 190)$. [4]

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5 Eric throws darts at a target. The probability that he will hit the centre of the target on one throw is p.

(a) Eric takes 100 throws and hits the centre x times. He uses this result to find an approximate 95% confidence interval for p. The width of this interval is 0.165 correct to 3 significant figures.

Find the two possible values of x. [4]

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Eric takes some more throws. He uses his results to calculate two approximate α % confidence intervals for p (where $\alpha > 90$).

It is given that the probability that exactly one of these two intervals contains the true value of p is 0.1128.

(b) Find the value of α. [3]

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6 The length of time, T minutes, that customers spend in a certain shop has the distribution N(μ, 9.2). Last year the value of μ was 12.4. The manager of the shop wants to test whether the value of μ has decreased this year. She chooses a random sample of 75 customers and finds that the sample mean, $\overline{T}$, for these customers is 11.9.

(a) Test at the 5% significance level whether the value of μ is less than 12.4. [5]

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(b) Explain whether it was necessary to use the Central Limit Theorem in your answer to **6(a)**. [1]

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(c) Later the manager chooses another large random sample of n customers. She finds that, for these customers, $\overline{T} = 11.8$. She carries out a similar test at the 5% significance level, and the conclusion is that there is evidence that the value of μ is less than 12.4.

Find the range of possible values of n. [3]

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7 A random variable X has the probability density function

$$f(x) = \begin{cases} a - x & 0 \leqslant x \leqslant a, \\ 0 & \text{otherwise,} \end{cases}$$

where a is a constant.

(a) Show that $E(X) = k\sqrt{2}$, where k is a constant to be found. [6]

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(b) Find the exact value of the median of X. [4]

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