



Cambridge International AS & A Level

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MATHEMATICS

9709/61

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 [].

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- 2** The random variable X has the distribution $B\left(8, \frac{3}{4}\right)$. A random sample of 100 values of X is chosen, and the sample mean, $\bar{X}$, is found.

- (a) Find $P(\bar{X} > 6.2)$. You are **not** expected to use a continuity correction. [6]

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- (b)** State why the Central Limit Theorem was needed in the calculation in part **(a)**. [1]

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- 3 The time, T minutes, for a certain daily bus journey is normally distributed. The bus company claims that the mean of T is 45. A passenger believes that the mean of T is actually greater than 45. She notes the times taken for this journey on a random sample of 60 days. The results are summarised below.

$$n = 60 \qquad \Sigma t = 2750 \qquad \Sigma t^2 = 127000$$

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

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- (b) Test the passenger's belief at the 5% significance level. [5]

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- 4 At an entertainment centre, the cost for using a particular video game is \$0.40 per minute. The number of minutes for which people use the video game has mean 15 and variance 9.

(a) Find the mean and variance of the amount people pay for using the video game. [3]

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Each day, 35 people independently use the video game.

(b) Find the mean and variance of the total amount paid by 35 people. [3]

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(b) The random variable Y has the distribution $\text{Po}(\lambda)$, where $\lambda > 0$.

It is given that $\frac{5}{2}P(Y = 3) + P(Y = 4) = P(Y = 5)$.

Find the value of λ .

[3]

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[1]

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- [3]

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At Florence's college, in a random sample of 40 students, it was found that 5 own a Pumpkin phone.

- (c) Calculate an approximate 95% confidence interval for the proportion of students at Florence's college who own a Pumpkin phone. [3]

[illegible]



(b) Show that $E(X) = \frac{1}{2} - \frac{2}{\pi^2}$.

[5]

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