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CAMBRIDGE
International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 3 8 8 5 1 6 0 4 2 7 *

MATHEMATICS **9709/63**

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 A five-sided spinner has edges marked 1, 2, 3, 4, 5. Ayesha believes that the spinner is biased so that it lands on five more often than it should. She spins the spinner 200 times, and it lands on five on 60 spins.

Use Ayesha's result to calculate an approximate 94% confidence interval for the probability that the spinner lands on five on one spin. [3]

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2 Bettie believes that 30% of students at her school are vegetarian. Amir claims that the proportion is less than 30%. In order to test his claim, Amir takes a random sample of 20 students at the school. He finds that exactly 2 students in the sample say that they are vegetarian.

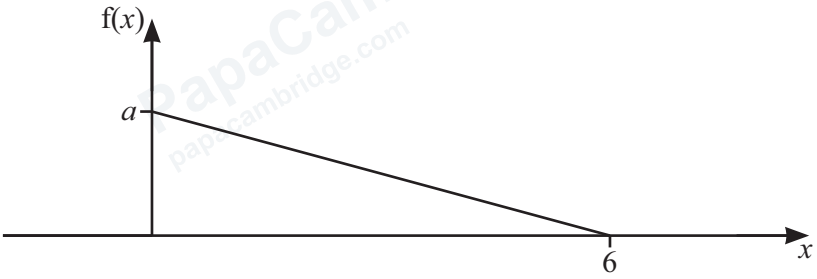
(a) Use a binomial distribution to test Amir's claim at the 2.5% significance level. [5]

(b) State the smallest significance level at which Amir's claim would be rejected. Give your answer correct to 3 significant figures. [1]

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A random variable X takes values between 0 and 6 only and has probability density function $f(x)$ as shown in the diagram, where a is a constant.

Given that $E(X) = 2$, find $Var(X)$. [6]

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4 Cars arrive at a junction at a constant average rate of 3.2 per minute.

(a) State a condition for the number of cars arriving per minute to have a Poisson distribution. [1]

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It is now given that the number of cars arriving per minute has the distribution Po(3.2).

(b) Find the probability that at least 4 cars arrive during a randomly chosen 3-minute period. [3]

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(c) Given that at least 4 cars arrive during a particular randomly chosen 3-minute period, find the probability that exactly 5 cars arrive during this period. [2]

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(d) Use a suitable approximating distribution to find the probability that more than 60 cars arrive during a randomly chosen 20-minute period. [5]

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5 The lengths, X cm, of Wamba snakes have mean μ cm. Research has shown that, for the whole population of Wamba snakes, $\mu = 41.5$. A researcher claims that, for the Wamba snakes in a particular region, the mean length is less than 41.5. She measures the lengths of a random sample of 150 Wamba snakes in this region. The results are summarised below.

$$n = 150 \qquad \Sigma x = 6030 \qquad \Sigma x^2 = 252\,014$$

(a) Find unbiased estimates of the population mean and variance of X for Wamba snakes in this region, showing that the unbiased estimate of variance is 64.483 correct to 3 decimal places. [3]

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(b) Assuming that Var(X) = 64.483 for the whole population of Wamba snakes, test the researcher's claim at the 2% significance level. [5]

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(c) Use your answer to **5(b)** to explain whether it is possible for the researcher to make a Type I error. [1]

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Later the researcher carries out a similar test at the 2% significance level, using the same hypotheses and another random sample of 150 Wamba snakes from this region.

(d) Given that the population mean length of Wamba snakes for this region is 38.7 cm, find the probability of a Type II error. [5]

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6 One batch of a cake mixture contains X litres of ingredient A and Y litres of ingredient B, where X and Y have the independent distributions $X \sim N(25.5, 0.07)$ and $Y \sim N(26.0, 0.08)$.

(a) Find the probability that, in a randomly chosen batch of the mixture, the number of litres of ingredient A is greater than the number of litres of ingredient B. [5]

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The mass of 1 litre of ingredient A is m kg and the mass of 1 litre of ingredient B is $1.5m$ kg, where m is a constant.

(b) Given that the probability that the total mass of a randomly chosen batch of the mixture is less than 70 kg is 0.3, find the value of m. [5]

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