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CAMBRIDGE
International Education

# Cambridge International AS & A Level

CANDIDATE NAME

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*2302618474*

**MATHEMATICS** **9709/61**

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 [ ].

This document has **12** pages.

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**[Turn over**

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**1** The masses, in grams, of apples of a certain type have the distribution $N(58.4, 6.3^2)$. The apples are packed in bags, with each bag containing 10 randomly chosen apples.

Find the probability that a randomly chosen bag contains apples whose total mass is between 550 g and 600 g. [5]

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**2** In the past, 2% of talking dolls made by a certain firm have been faulty. Following a change in the manufacturing process, a quality control officer suspects that the percentage of faulty talking dolls has increased. In order to test his suspicion, he selects 50 talking dolls at random. If the number of faulty talking dolls is more than 3, he will conclude that the percentage has increased.

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

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

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**(c)** Given that the true percentage of faulty talking dolls is now 12%, use a binomial distribution to find the probability of a Type II error. [3]

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**3** In the work done by a typesetting department, incorrect characters appear randomly and independently at a constant average rate of 5 incorrect characters per 100 pages.

**(a)** A book that is typeset in the department contains 500 pages. The number of incorrect characters in the book is denoted by $X$.

**(i)** State the distribution of $X$, including the values of any parameters. [1]

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**(ii)** State an appropriate approximating distribution for $X$, including the values of any parameters.

Justify your choice of approximating distribution. [2]

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**(iii)** Use your approximating distribution to find $P(X > 35)$. [3]

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**(b)** Another book that is typeset in the department contains $n$ pages. The probability that the book contains fewer than 18 incorrect characters is less than 0.01.

Use an approximating distribution to find the largest possible value of $n$. [5]

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**4** The score on one spin of a 5-sided spinner is denoted by the random variable $X$ with probability distribution as shown in the table.

| $x$ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| $\mathbf{P}(X = x)$ | 0.1 | 0.3 | 0.4 | 0.1 | 0.1 |

**(a)** Show that $\mathrm{E}(X) = 2.8$. [1]

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It is given that $\mathrm{Var}(X) = 1.16$.

The spinner is spun 300 times. The score on each spin is noted and the mean, $\overline{X}$, of the 300 scores is found.

**(b)** Given that $\mathrm{P}(2.8 - k < \overline{X} < 2.8 + k) = 0.2$, find the value of $k$. [4]

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**(c)** Explain why it was necessary to use the Central Limit Theorem in your answer to **4(b)**. [1]

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**(d)** For another similar spinner, it is claimed that $E(X) = 2.8$. Fred suspects that this value is incorrect. The spinner is spun 300 times, and the mean of the 300 scores is found to be 2.92.

Given that the variance of the score on one spin of this spinner is also 1.16, test Fred's suspicion at the 5% significance level. [5]

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**5** **(a)** $X$ and $Y$ are independent random variables such that $X \sim \text{Po}(2.5)$ and $Y \sim \text{Po}(\lambda)$.

**(i)** Find $\text{P}(1 \leqslant X \leqslant 3)$. [2]

**(ii)** Given that $\text{P}(X = 5) = \text{P}(X + Y = 0)$, find $\text{P}(X + Y = 1)$. [4]

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**(b)** The random variable $W$ has the distribution B(200, 0.02). It is given that, using the binomial distribution, $P(W = 2) = 0.146$, correct to 3 decimal places.

Show that a suitable approximating distribution gives the same value of $P(W = 2)$ correct to 2 decimal places, but not correct to 3 decimal places. [4]

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**6** A random variable $X$ has probability density function given by

$$f(x) = \begin{cases} \frac{8}{7}\lambda e^{-\lambda x} & 0 < x < \ln 2, \\ 0 & \text{otherwise,} \end{cases}$$

where $\lambda$ is a constant.

**(a)** Show that $\lambda = 3$. [4]

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**(b)** Use integration by parts to find E($X$). [4]

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## Additional page

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