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CAMBRIDGE
International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0528438120

MATHEMATICS **9709/53**

Paper 5 Probability & Statistics 1 **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 A fair 8-sided dice with faces labelled 1, 2, 3, 4, 5, 6, 7, 8 is thrown repeatedly.

(a) Find the probability that a 5 will be obtained for the first time on the 7th throw. [1]

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(b) Find the probability that a 5 will be obtained for the first time before the 10th throw. [2]

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(c) Find the probability that a 5 will be obtained at least once but no more than three times in 12 randomly chosen throws. [3]

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2 The random variable X takes the values -2, 0, 1, 3. It is given that $\mathrm{P}(X = x) = k(x+1)^2$, where k is a constant.

(a) Draw up the probability distribution table for X, giving the probabilities as numerical fractions **not** involving k. [3]

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(b) Find the value of $\mathrm{Var}(X)$. [3]

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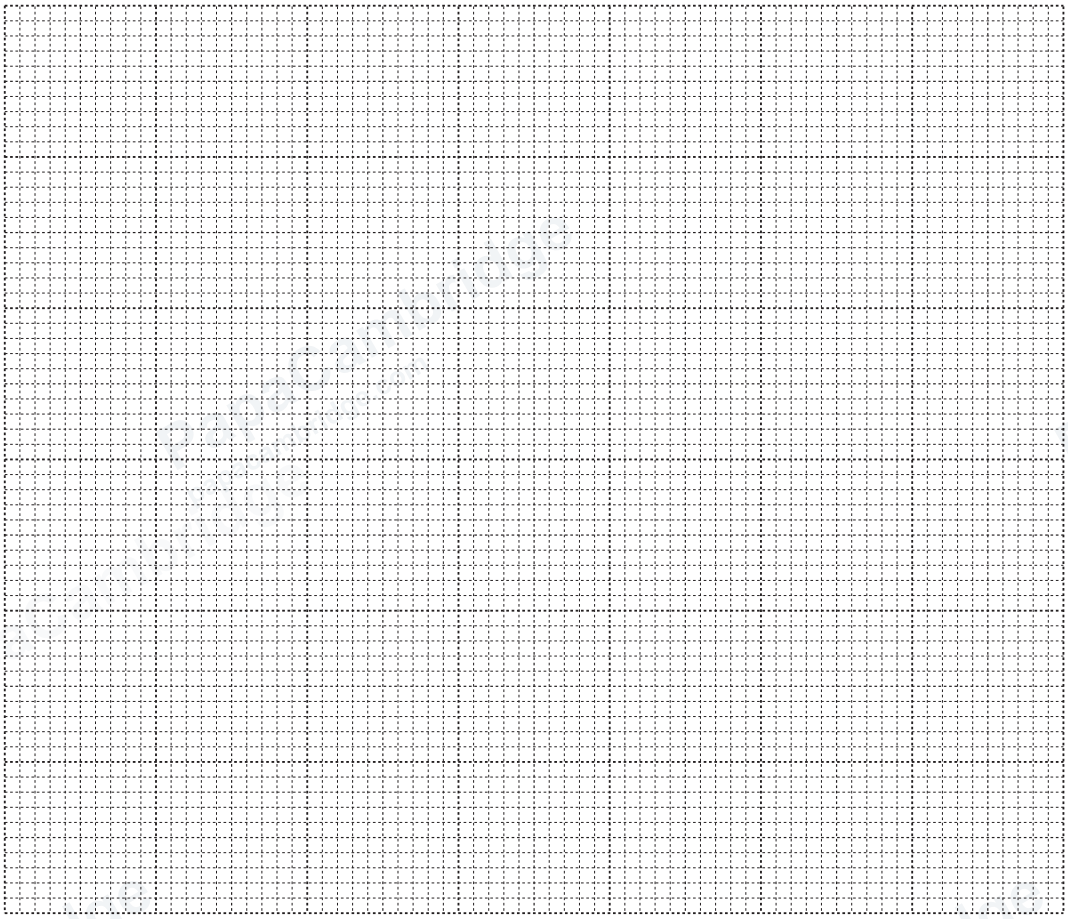
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3 The times taken, in minutes, by 150 students to complete a particular computer game are summarised in the table.

time taken (t minutes)	$0 \leqslant t < 10$	$10 \leqslant t < 15$	$15 \leqslant t < 20$	$20 \leqslant t < 25$	$25 \leqslant t < 35$	$35 \leqslant t < 60$
frequency	4	24	40	46	26	10

(a) Draw a histogram to represent this information. [4]



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(b) Calculate an estimate for the mean of these times. [3]

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(c) In which class interval does the 40th percentile of the times lie? [1]

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4 Ebere has a coin which is biased so that the probability of obtaining a head is $\frac{1}{4}$. She also has two bags containing coloured discs. Bag A contains 5 red discs and 3 blue discs. Bag B contains 4 red discs and 5 green discs.

Ebere tosses her coin. If she obtains a head, she chooses two discs from bag A, at random, one at a time and without replacement. If she obtains a tail, she chooses two discs from bag B, at random, one at a time and without replacement.

(a) Draw a fully labelled tree diagram to represent this information. [2]

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(b) Find the probability that Ebere obtains two discs of the same colour. [3]

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(c) Find the probability that Ebere obtained a head with her coin given that at least one of the discs is red. [4]

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5 The lengths of Indian cobra snakes are normally distributed with mean 125 cm and standard deviation 8 cm.

(a) Find the probability that a randomly chosen Indian cobra has a length between 105 cm and 135 cm. [3]

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The masses of Indian cobras are normally distributed with mean 2.5 kg and standard deviation σ kg. It is known that 81% of Indian cobras have a mass less than 2.7 kg.

(b) Find the value of σ. [3]

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A random sample of 80 Indian cobras is taken.

(c) Use an approximation to find the probability that fewer than 60 of these 80 Indian cobras have a mass less than 2.7 kg. [5]

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6 **(a)** Find the number of different arrangements of the 10 letters in the word POSSESSION in which the four Ss are all next to each other and the two Os are **not** next to each other. [3]

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(b) Find the number of different arrangements of the 10 letters in the word POSSESSION in which the P is at the beginning, the N is at the end and there are exactly four letters between the two Os. [3]

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Five letters are selected from the 10 letters in the word POSSESSION.

(c) Find the number of different selections in which the five letters include at least two Ss and at least one O. [4]

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Additional page

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