



Cambridge International AS & A Level

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MATHEMATICS**9709/51**

Paper 5 Probability & Statistics 1

October/November 2024**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 [].

This document has **16** pages. Any blank pages are indicated.



- 1 Nicola throws an ordinary fair six-sided dice. The random variable X is the number of throws that she takes to obtain a 6.

(a) Find $P(X < 8)$. [2]

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(b) Find the probability that Nicola obtains a 6 for the second time on her 8th throw. [2]

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

(a) Draw up the probability distribution table for X , giving the probabilities as numerical fractions. [3]

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

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- 3 The time taken, in minutes, to walk to school was recorded for 200 pupils at a certain school. These times are summarised in the following table.

Time taken (t minutes)	$t \leq 15$	$t \leq 25$	$t \leq 30$	$t \leq 40$	$t \leq 50$	$t \leq 70$
Cumulative frequency	18	46	88	140	176	200

- (a) Draw a cumulative frequency graph to illustrate the data.

[2]



- (b) Use your graph to estimate the median and the interquartile range of the data.

[3]

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[illegible]

[illegible]

- (a) Find the probability that a randomly chosen green apple weighs between 83 grams and 95 grams. [4]

[illegible]



- Use a suitable approximation to find the probability that fewer than 105 of the chosen red apples weigh more than 80 grams. [5]

[illegible]

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- This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



- [illegible]



- 7 (a) How many different arrangements are there of the 9 letters in the word INTELLECT in which the two Ts are together? [2]

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- (b) How many different arrangements are there of the 9 letters in the word INTELLECT in which there is a T at each end and the two Es are not next to each other? [3]

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[illegible]



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