



Cambridge International AS & A Level

CANDIDATE
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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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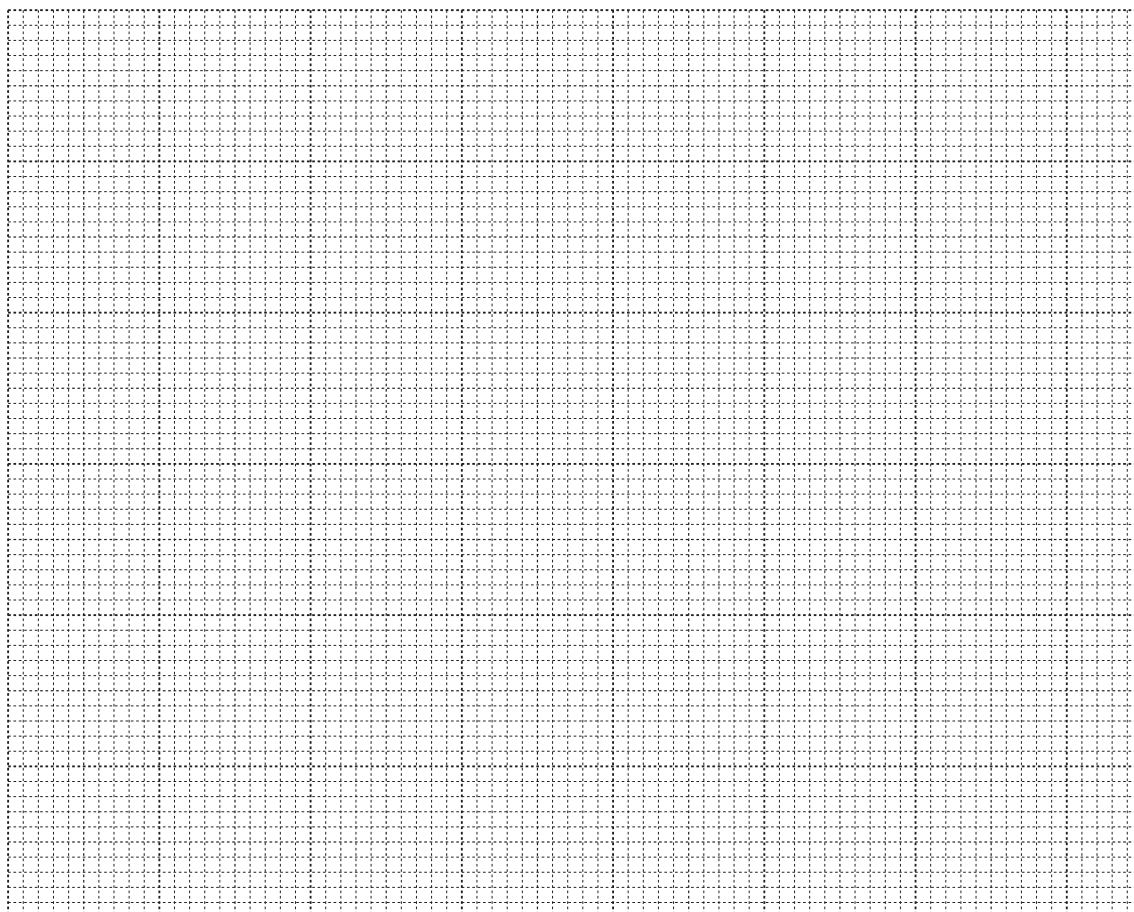


- 3 The time taken, in minutes, to walk to school was recorded for 200 pupils at a certain school. These times are summarised in the following table.

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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This image shows a full page of a handwriting practice worksheet. It consists of approximately 20 horizontal rows. Each row is defined by two parallel dotted lines, creating a series of uniform gaps for writing. The lines are evenly spaced across the entire page, providing a guide for letter height and placement. There is no text or other markings on the page.



This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the entire width of the page. There are no margins, text, or other markings present.

- (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]

This image shows a full page of a worksheet designed for handwriting practice. It consists of approximately 20 horizontal rows. Each row is defined by two parallel dotted lines, creating a series of uniform gaps where letters can be formed. The lines are evenly spaced across the entire page, providing a guide for letter height and placement. There is no text or other markings on the page.

[illegible]



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- This image shows a full page of a document template designed for handwriting practice or as a general writing guide. It consists of approximately 20 evenly spaced, horizontal dotted lines running across the width of the page. The background is plain white, and there are no margins, headers, footers, or other markings present.



- 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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