



Cambridge International AS & A Level

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

083080638

MATHEMATICS 9709/52

Paper 5 Probability & Statistics 1

May/June 2025

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 12 pages.



Rachel has three coins. The first coin is biased so that the probability of obtaining a head when it is thrown is $\frac{1}{3}$. The second coin is biased so that the probability of obtaining a head when it is thrown is $\frac{1}{4}$. The third coin is fair.

Rachel throws the three coins at the same time. The random variable X is the number of **tails** that she obtains.

Draw up the probability distribution table for X .	[3]

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2 In Millford, 70% of the residents own a bicycle. A random sample of 160 residents is selected.

Use a suitable approximation to find the probability that more than 120 of these residents own a bicycle. [5]

A bag contains 4 blue marbles and 12 red marbles. One marble is selected at random from the bag. If 3 this marble is blue, it is replaced in the bag, but if it is red, it is not replaced. A second marble is now selected at random from the bag.

) Find the probability that both marbles	s selected are the same colour.	[
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) Find the probability that the first mark	ble is blue given that the second marble is red.	[
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Vehicles approaching a certain road junction from Bromley must go either left, right or straight on. Over time, it is known that 30% turn left, 25% turn right and 45% go straight on. The driver of each vehicle chooses a direction independently of all other drivers.

(a)	different directions. [2]
(b)	Find the probability that, from the vehicles approaching this junction from Bromley today, the 1st vehicle to go left is before the 9th vehicle.
(c)	Find the probability that, from the vehicles approaching this junction from Bromley today, the 2nd
	vehicle to go left is the 7th vehicle. [2]

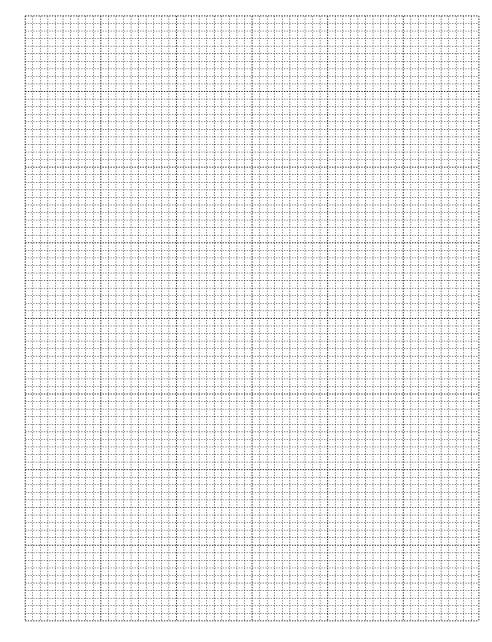
[2]



5 The times taken, t minutes, by 300 students to travel to Hollowton College are recorded. The results are summarised in the table below.

Time (t minutes)	<i>t</i> ≤ 10	<i>t</i> ≤ 20	<i>t</i> ≤ 30	<i>t</i> ≤ 40	<i>t</i> ≤ 60	<i>t</i> ≤ 90
Cumulative frequency	34	86	142	208	265	300

(a) On the grid, draw a cumulative frequency graph to illustrate this information.



(b)	120 students take more than k minutes to travel to college. Use your graph to estimate the value of k

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(c) Cal	lculate estima 300 students	ates of the mean	and standare	d deviation of	the times taken to t	ravel to college by [6]
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	Find the number of different ways in which the 10 letters in the word AMALGAMATE car arranged so that there is an M at the beginning, an M at the end and no As are together.
(b)	Find the number of different ways in which the 10 letters in the word AMALGAMATE car arranged with exactly 3 letters between the two Ms.

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Five	e letters are selected from the 10 letters in the word AMALGAMATE.
(c)	Find the number of different selections in which the five letters include at least one M and at least two As. [3]

7	Kestrels are birds whose adult wing	spans are normally	y distributed	with mean	74.8 cm	and	standard
	deviation 3.2 cm. A random sample o	120 adult kestrels	is selected.				

	How many of these 120 adult kestrels would you expect to have wingspan between 72.4 cm at 76.3 cm?
is	masses of adult kestrels are normally distributed with mean μ kg and standard deviation σ k known that 20% of adult kestrels have mass greater than 0.202kg and 28% have mass less th 5 kg.
is 18	known that 20% of adult kestrels have mass greater than 0.202 kg and 28% have mass less the
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is 8	known that 20% of adult kestrels have mass greater than $0.202\mathrm{kg}$ and 28% have mass less th $5\mathrm{kg}$.

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	dult kestrels are selected at random.			
) Find the probability that fewer than 3 have masses	greater than 0.202 kg. [3]		
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Additional page

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