* 0000800000001 *

Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5061133537

MATHEMATICS **9709/53**

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 **12** pages. Any blank pages are indicated.

DC (DE/CB) 337398/1
© UCLES 2024

[Turn over

BLANK PAGE

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

1 30% of the residents of Wimfield own an electric car. Three residents are chosen at random.

(a) Find the probability that either all three own an electric car or none of them owns an electric car. [2]

.....

.....

.....

.....

.....

.....

.....

.....

A random sample of 125 of the residents of Wimfield is selected.

(b) Use a suitable approximation to find the probability that more than 45 of these residents own an electric car. [5]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

2 A red fair six-sided dice has faces labelled 1, 1, 1, 2, 2, 2. A blue fair six-sided dice has faces labelled 1, 1, 2, 2, 3, 3. Both dice are thrown. The random variable X is the product of the scores on the two dice.

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

(b) Find E(X). [1]

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

3 In Molimba, the heights, in cm, of adult males are normally distributed with mean 176 cm and standard deviation 4.8 cm.

(a) Find the probability that a randomly chosen adult male in Molimba has a height greater than 170 cm. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

60% of adult males in Molimba have a height between 170 cm and k cm, where k is greater than 170.

(b) Find the value of k, giving your answer correct to 1 decimal place. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

4 On a certain day, the heights of 150 sunflower plants grown by children at a local school are measured, correct to the nearest cm. These heights are summarised in the following table.

Height (cm)	10–19	20–29	30–39	40–44	45–49	50–54	55–59
Frequency	10	18	32	42	28	14	6

(a) Draw a cumulative frequency graph to illustrate the data. [4]



(b) Use your graph to estimate the 30th percentile of the heights of the sunflower plants. [2]

.....

.....

DO NOT WRITE IN THIS MARGIN

(c) Calculate estimates for the mean and the standard deviation of the heights of the 150 sunflower plants. [5]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

5 A factory produces chocolates. 30% of the chocolates are wrapped in gold foil, 25% are wrapped in red foil and the remainder are unwrapped.

Indigo chooses 8 chocolates at random from the production line.

(a) Find the probability that she obtains no more than 2 chocolates that are wrapped in red foil. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Jake chooses chocolates one at a time at random from the production line.

(b) Find the probability that the first time he obtains a chocolate that is wrapped in red foil is before the 7th choice. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS MARGIN

Keifa chooses chocolates one at a time at random from the production line.

(c) Find the probability that the second chocolate chosen is the first one wrapped in gold foil given that the fifth chocolate chosen is the first unwrapped chocolate. [5]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

6 **(a)** Find the number of different arrangements of the 9 letters in the word HAPPINESS. [1]

.....

.....

.....

.....

.....

.....

.....

.....

(b) Find the number of different arrangements of the 9 letters in the word HAPPINESS in which the first and last letters are not the same as each other. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS MARGIN

(c) Find the number of different arrangements of the 9 letters in the word HAPPINESS in which the two Ps are together and there are exactly two letters between the two Ss. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

The 9 letters in the word HAPPINESS are divided at random into a group of 5 and a group of 4.

(d) Find the probability that both Ps are in one group and both Ss are in the other group. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.