



Cambridge International AS & A Level

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MATHEMATICS

9709/52

Paper 5 Probability & Statistics 1

February/March 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 **16** pages. Any blank pages are indicated.



- 1 Jacob throws three coins at the same time.
 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 biased so that the probability of obtaining a head when it is thrown is $\frac{1}{5}$.
 The random variable X is the number of heads obtained.

(a) Show that $P(X = 2) = \frac{3}{20}$. [1]

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

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(c) Given that $E(X) = \frac{47}{60}$, find $\text{Var}(X)$.

[2]





- 2 Last year, an online store sold a large number of computers. 55% of the computers were made by company F , 30% were made by company G and 15% were made by company H .

A random sample of 3 customers who each bought a computer from this store is chosen.

- (a) Find the probability that the 3 customers bought computers all made by different companies. [1]

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A random sample of 12 customers who each bought a computer from this store is chosen.

- (b) Find the probability that fewer than 10 of these customers bought a computer made by company F . [3]

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A random sample of 140 customers who each bought a computer from this store is chosen.

- (c) Use a suitable approximation to find the probability that more than 24 of these customers bought a computer made by company H . [5]

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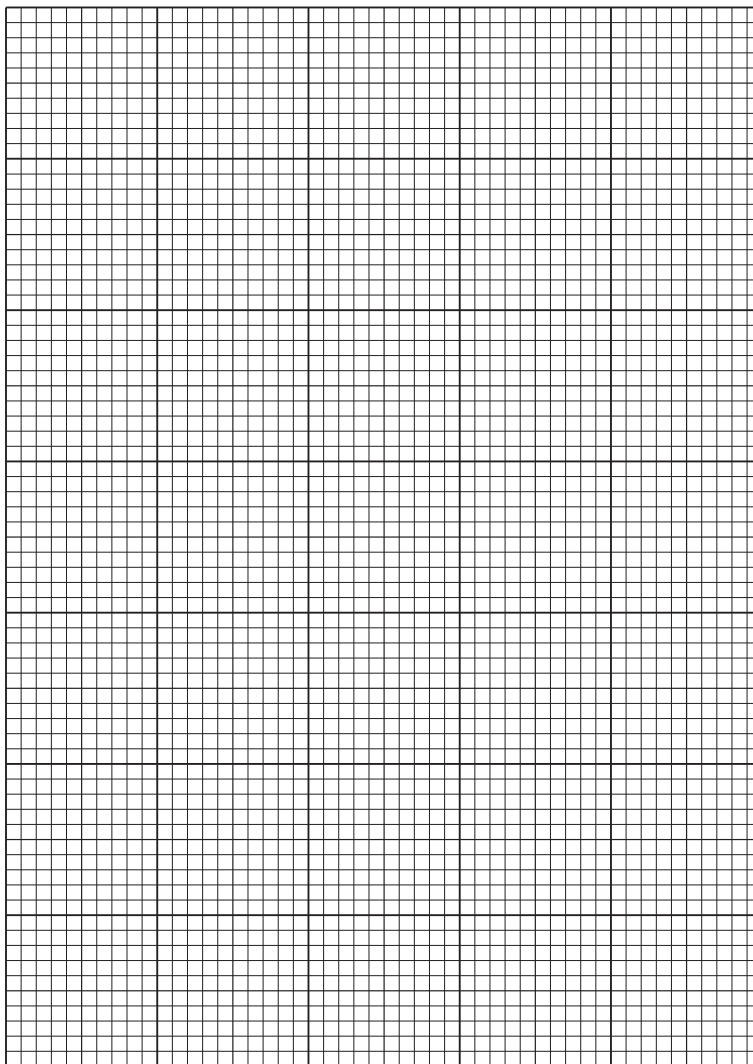


- 3 The lengths of 250 leaves of a certain type of plant are measured, correct to the nearest centimetre. The results are summarised in the table below.

Length (cm)	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 39
Frequency	18	28	60	72	48	24

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

[4]





- (b) 38% of these leaves are of length k cm or more.

Use your graph to find an estimate for k .

[2]

- (c) Calculate an estimate for the mean length of these 250 leaves.

[3]





- 4 Eddie has 16 toy cars, of which 8 are white, 5 are black and 3 are silver. He places all the cars in a bag and selects three of them at random, without replacement.

(a) Find the probability that all three cars are the same colour. [3]

[illegible]



- (b) Find the probability that, when the 3 cars are selected, at least one car is white and at least one car is black. [4]

[illegible]



- 5 The mass of peaches sold per day in a supermarket is normally distributed with mean 65.8 kg and standard deviation 9.6 kg.

- (a) Find the probability that the mass of peaches sold on any given day is between 56 kg and 75 kg. [3]

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The mass of cherries sold per day in a supermarket is normally distributed with mean 72.4 kg and standard deviation σ kg. It is known that on 10% of days less than 59.1 kg of cherries are sold.

- (b) Find the value of σ . [3]

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The supermarket is open 7 days a week.

- (c) Find the probability that, in a randomly chosen week, the first day on which less than 59.1 kg of cherries are sold is the fifth day of the week. [1]

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- (d) Find the probability that, in a randomly chosen week, the first day on which less than 59.1 kg of cherries are sold is before the fifth day of the week. [2]

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- (c) How many different colour arrangements are there of the 10 books with exactly 4 books between the 2 yellow books? [3]

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Alissa selects 4 books from her 10 different books from the series Squares and Circles.

- (d) Find the number of different selections if the 4 books include at least 1 red book, at most 1 blue book and exactly 1 yellow book. [4]

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