Cambridge Assessment International Education

# Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER



**MATHEMATICS** **9709/52**

Paper 5 Probability & Statistics 1 **October/November 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.




[Turn over

**1** A coin is biased so that the probability of obtaining a head when it is thrown is 0.4. The coin is thrown repeatedly until the first head is obtained.

**(a)** Find the probability that the first head is obtained on the 5th throw. [1]

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(b)** Find the probability that the first head is obtained after the 6th throw. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**2** Kayla has a bag containing 3 red marbles, 1 blue marble and 2 green marbles. She selects one marble from the bag at random and does not replace it in the bag. She repeats this process until she obtains a green marble. The random variable $X$ is the number of marbles that she needs to select until she obtains a green marble.

**(a)** Draw up the probability distribution table for $X$. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(b)** Find Var($X$). [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**3** The heights of the 124 Senior members of the Giraffes basketball club are normally distributed with mean 187.4 cm and standard deviation 6.4 cm.

**(a)** How many members of the club would you expect to have heights within 5 cm of the mean? [4]

The heights of the Junior members of the Giraffes club are normally distributed with mean 172.7 cm and standard deviation $\sigma$ cm. 23% of these members have height less than 170.3 cm.

**(b)** Find the value of $\sigma$. [3]

**4** Gio has a pack of 18 cards. Ivy has a pack of $x$ cards.

Each card has a picture of a bus or a car or a train. The number of cards with each picture in the two packs is shown in the table.

| | Bus | Car | Train |
|---|---|---|---|
| Gio's pack | 6 | 10 | 2 |
| Ivy's pack | $x-12$ | 9 | 3 |

One card is chosen at random from each pack. The probability that the two cards have pictures of buses on them is equal to twice the probability that the two cards have pictures of cars on them.

**(a)** Write down an equation in terms of $x$ and hence find the value of $x$. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

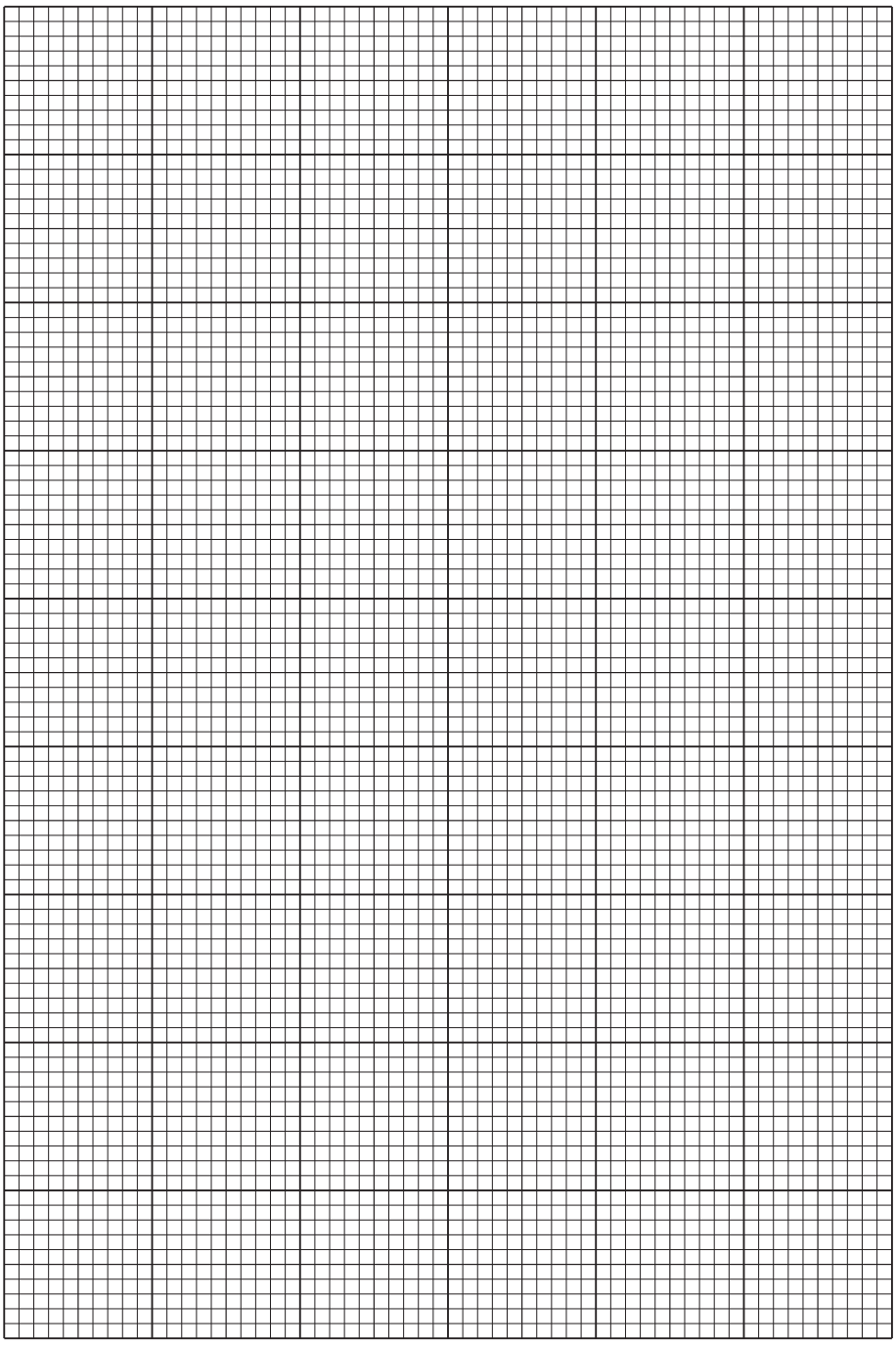
.....

**(b)** Find the probability that the two cards have pictures of the same type of vehicle on them. [3]

**5** The times of 240 competitors taking part in an event are recorded correct to the nearest minute. The results are summarised in the table.

| Time (minutes) | 1 – 10 | 11 – 20 | 21 – 25 | 26 – 30 | 31 – 50 |
|---|---|---|---|---|---|
| Frequency | 12 | 38 | 68 | 76 | 46 |

**(a)** Draw a histogram to represent this information. [4]



**(b)** Calculate an estimate of the mean time taken by the 240 competitors. [3]

**6** For a randomly chosen person, their next birthday is equally likely to occur on any day of the week, independently of any other person's birthday.

**(a)** Find the probability that, out of 10 randomly chosen people, none of them will have their next birthday on a Saturday or Sunday. [1]

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(b)** Find the probability that, out of 10 randomly chosen people, fewer than 3 will have their next birthday on a Wednesday. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(c)** Use a suitable approximation to find the probability that, out of 392 randomly chosen people, more than 65 will have their next birthday on a Friday. [5]

7 **(a)** Find the number of different arrangements of the 10 letters in the word ZOOLOGICAL in which the three Os are together and the two Ls are **not** next to each other. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(b)** Find the number of different arrangements of the 10 letters in the word ZOOLOGICAL in which there are exactly 5 letters between the two Ls. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Two letters are chosen at random from the 10 letters in the word ZOOLOGICAL.

**(c)** Find the probability that these two letters are different. [3]

**Additional page**

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



**BLANK PAGE**

**BLANK PAGE**