Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

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MATHEMATICS **9709/53**

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.

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1 There are a large number of students at Greenfield college. Each student travels to college by car, by bus or on foot, independently of any other student. The probability that any student travels by car is 0.4. The probability that any student travels by bus is 0.35.

(a) 3 students from Greenfield college are selected at random.

Find the probability that none of these 3 students travel to college by car. [1]

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(b) 11 students from Greenfield college are selected at random.

Find the probability that fewer than 9 of these 11 students travel to college by car or by bus. [3]

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2 The Splash Club has 26 members, of whom 16 are swimmers and 10 are divers. No member is both a swimmer and a diver. The club committee consists of 6 of these 26 members.

In how many ways can the club committee be selected if it must include at least 2 swimmers and at least 2 divers? [4]

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3 **(a)** Find the number of different arrangements of the 9 letters in the word DAFFODILS in which there is a D at each end and the two Fs are **not** next to each other. [3]

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(b) Find the probability that a randomly chosen arrangement of the 9 letters in the word DAFFODILS has exactly 4 letters between the two Ds. [3]

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4 A fair red spinner has 4 sides, numbered 1, 2, 3, 4. A fair blue spinner has 4 sides, numbered 0, 1, 2, 3. When a spinner is spun, the score is the number on the side on which it lands. The two spinners are spun at the same time.

The random variable X denotes the higher of the two scores obtained. If the two scores are equal, then the value of X is 0.

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

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

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The red spinner, with sides numbered 1, 2, 3, 4, is spun repeatedly.

(c) Find the probability that it lands on 4 for the first time before the 8th spin. [2]

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5 Chen has three boxes. Box *A* contains 5 counters, of which 3 are white and 2 are yellow. Box *W* contains 4 red marbles and 3 blue marbles. Box *Y* contains 5 red marbles and 3 blue marbles.

Chen chooses one counter at random from box *A*. If the counter is white, he chooses two marbles from box *W*, at random and without replacement. If the counter is yellow, he chooses two marbles from box *Y*, at random and without replacement.

(a) Draw a fully labelled tree diagram to illustrate this information, including all the probabilities. [3]

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(b) Find the probability that one red marble and one blue marble are obtained. [3]

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(c) Find the probability that a white counter is chosen from box *A*, given that one red marble and one blue marble are obtained. [2]

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6 Last Saturday, a cycling competition for teams of 11 cyclists took place. For each cyclist, the time taken to complete the course was recorded to the nearest minute. The times taken by the cyclists from two teams, the Linnets and the Puffins, are shown in the following table.

Linnets	48	51	54	57	59	60	64	64	65	68	70
Puffins	45	49	51	55	55	58	59	62	64	64	74

(a) Draw a back-to-back stem-and-leaf diagram to represent this information, with Linnets on the left-hand side. [4]

(b) Find the interquartile range of the times taken by the Linnets. [2]

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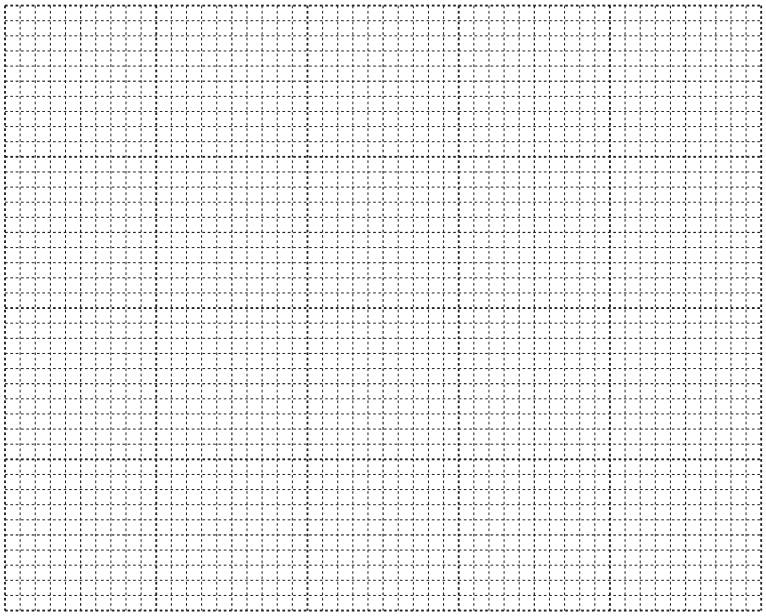
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(c) On the grid below, draw a box-and-whisker plot to represent the information for the Linnets and the Puffins. [3]



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(d) Make one comparison between the times taken by the Linnets and the times taken by the Puffins. [1]

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7 The times taken by Obi to walk to work each morning are normally distributed with mean 14.8 minutes and standard deviation 1.5 minutes.

(a) Find the probability that, on a randomly chosen day, Obi takes more than 15.6 minutes to walk to work. [3]

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(b) On 90% of days, Obi takes more than t minutes to walk to work.

Find the value of t. [3]

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Obi walks to work 5 days a week for 45 weeks in a year.

(c) On how many days in a year would you expect Obi to take within one minute of the mean time to walk to work? [4]

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