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Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8428423217

MATHEMATICS **9709/55**

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 A fair 6-sided dice with faces labelled 1, 2, 3, 4, 5, 6 is thrown repeatedly. The random variable X denotes the number of throws required to obtain a 6.

(a) Find $P(X = 7)$. [1]

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(b) Find $P(3 \leqslant X \leqslant 5)$. [2]

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2 Kai has a spinner with four sides, labelled 1, 2, 3, 4. When the spinner is spun, the score is the number on the side on which the spinner lands. The random variable X denotes this score. The probability distribution table for X is given below.

x	1	2	3	4
$\mathrm{P}(X = x)$	p	0.4	$2p$	p

(a) Find the numerical value of $\mathrm{Var}(X)$. [4]

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Kai spins his spinner 10 times.

(b) Find the probability that a score of 2 is obtained fewer than 8 times. [3]

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3 Priti has two bags of discs, X and Y.

Bag X contains 8 red discs and 7 blue discs.

Bag Y contains 6 red discs and 9 blue discs.

Priti tosses a fair coin.

If she obtains a head, she chooses at random and **without** replacement two discs from bag X.

If she obtains a tail, she chooses at random and **with** replacement two discs from bag Y.

(a) Draw a tree diagram to represent this information, showing all the probabilities. [2]

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(b) Find the probability that the two discs that Priti chooses are blue. [2]

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(c) Find the probability that the two discs that Priti chooses come from bag X given that at least one of the discs is red. [4]

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4 The heights, in cm, of 15 players from each of two sports teams, Pelicans and Swans, are given in the table.

Pelicans	156	160	164	165	167	170	171	173	178	182	182	184	185	186	187
Swans	170	180	183	165	174	158	170	181	162	178	174	163	191	182	174

(a) Draw a back-to-back stem-and-leaf diagram to represent the heights of the players from Pelicans and Swans, with Pelicans on the left-hand side. [4]

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(b) Find the median and the interquartile range of the heights of the Pelicans. [3]

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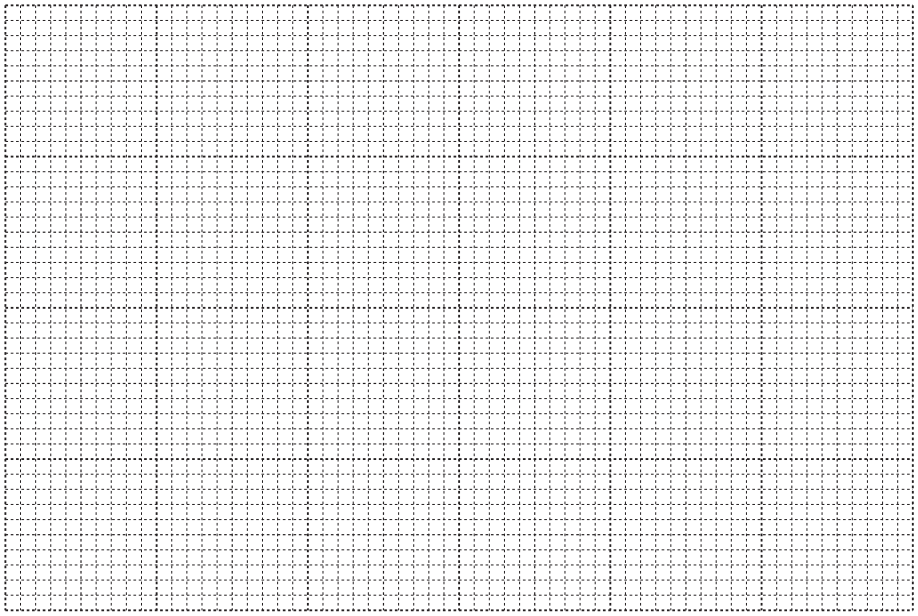
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For the Swans, the lower quartile of the heights is 165 cm, the median is 174 cm and the upper quartile is 181 cm.

(c) Represent the data shown in the back-to-back stem-and-leaf diagram by a pair of box-and-whisker plots in a single diagram. [3]



(d) Make one comparison between the heights of the Pelicans players and the heights of the Swans players. [1]

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5 In a group of 25 athletes, there are 8 sprinters, 5 hurdlers and 12 throwers.

(a) Find the number of different ways in which a team of 6 athletes can be selected if it consists of at least 3 sprinters, at most 2 hurdlers and at most 1 thrower. [4]

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A group of 8 athletes chosen from the group of 25 athletes consists of 1 sprinter, 3 hurdlers and 4 throwers. These 8 athletes stand in a row.

(b) How many different arrangements of the 8 athletes are there if the 3 hurdlers do not stand all together? [3]

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(c) How many different arrangements of the 8 athletes are there in which there are at least two athletes between any two hurdlers? [3]

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6 A large number of runners took part in two charity runs to raise money for a new community centre.

In the first run, the times to complete the run were normally distributed with mean 46.3 seconds and standard deviation 6.4 seconds.

(a) Find the probability that a randomly chosen runner took more than 55.1 seconds to complete the run. [3]

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In the second run, the times to complete the run were normally distributed with mean 39.8 seconds and standard deviation σ seconds. 10% of the runners took more than 48.6 seconds.

(b) Find the value of σ. [3]

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150 runners are chosen at random from those who took part in the second run.

(c) Use an approximation to find the probability that fewer than 20 of the 150 runners took more than 48.6 seconds to complete the run. [5]

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