Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS **9709/55**

Paper 5 Probability & Statistics 1 **May/June 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 **12** pages. Any blank pages are indicated.

DC (CE/CT) 357656

[Turn over

BLANK PAGE

1 Two fair 6-sided dice with faces labelled 1, 2, 3, 4, 5, 6 are thrown. The two scores are noted. The random variable X is defined as follows.

- If the two scores are equal, $X = 0$
- If the scores are not equal, X is the larger score minus the smaller score

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

2 The heights of trees in a certain forest are classified as tall, medium or small. The heights can be modelled by a normal distribution with mean 20 m and standard deviation 5 m. Trees with a height of less than 14 m are classified as small.

(a) For 150 randomly chosen trees from this forest, how many would you expect to be classified as small? [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Trees from this forest are classified as tall if their height is at least h m. 25% of the trees are classified as tall.

(b) Find the value of h. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

3 In a certain large school, on average, two pupils in five have music lessons.

A random sample of 80 pupils from this school is chosen.

(a) Use an approximation to find the probability that fewer than 27 pupils have music lessons. [5]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

A random sample of 10 pupils from this school is now chosen.

(b) Find the probability that no more than 2 pupils have music lessons. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

4 Students applying to Drydale College take an entrance test. A student is either accepted or rejected or required to take another test with probabilities 0.3, 0.2 and 0.5 respectively. When a student takes a second test the outcomes and probabilities are exactly the same as for the first test. A student who has to take a third test is accepted with probability 0.25 and rejected with probability 0.75.

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

(b) Find the probability that a randomly chosen student who applies to Drydale College is accepted. [2]

.....

.....

.....

.....

.....

.....

.....

(c) Find the probability that a randomly chosen student who applies to Drydale College takes at least two tests given that the student is accepted. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Three friends apply to Drydale College.

(d) Find the probability that all three are rejected. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

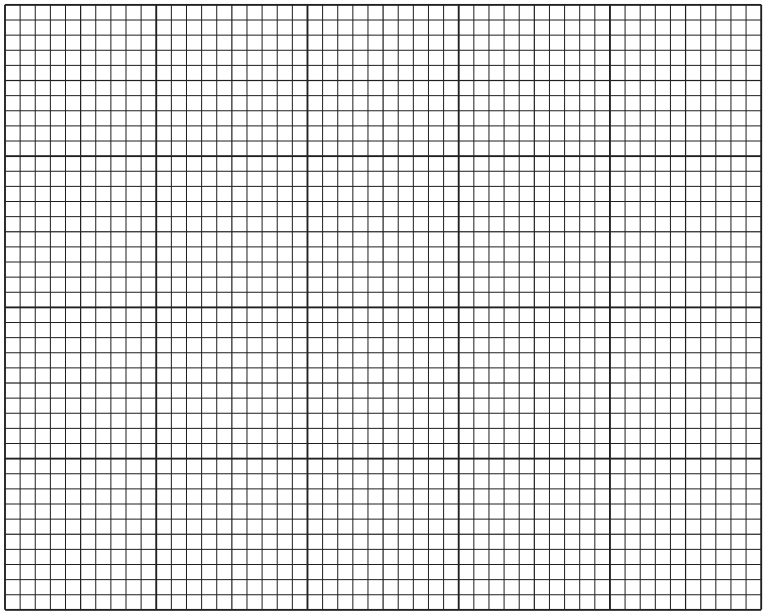
5 The Smarts and the Teasers are two quiz teams that each contain 11 members. Both complete a puzzle and the following table gives the times taken, in minutes, by the members of each team.

Smarts	38	30	13	29	18	22	28	18	11	9	41
Teasers	39	37	18	36	25	25	32	21	15	12	39

(a) Represent this information in a back-to-back stem-and-leaf diagram with Smarts on the left-hand side. [4]

For the Teasers, the values of the lower quartile, median and upper quartile are 18, 25 and 37 minutes respectively.

(b) On a single diagram draw box-and-whisker plots for the two teams. [4]



(c) Make two comparisons between the times for the two teams. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

6 A darts club has 12 members made up of 7 men and 5 women.

Every Monday, a team of 4 is chosen at random to represent the club in a competition.

(a) Find the probability that, on a particular Monday, the team consists of 1 man and 3 women. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Every Tuesday, the darts club chooses 3 teams of 4. Each team enters a competition in a different town.

(b) In how many different ways can the teams be chosen if there are no restrictions? [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) In how many different ways can the teams be chosen if each team must contain at least 1 man and at least 1 woman? [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

The 7 men stand in a line for a photograph. Two of them are brothers, George and Harry.

(d) How many different arrangements are there of the 7 men in which there are exactly 2 men between George and Harry? [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Additional page

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