Cambridge International AS & A Level

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CANDIDATE NAME

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5443970495

MATHEMATICS **9709/63**

Paper 6 Probability & Statistics 1 **(S1)** **October/November 2019**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: List of Formulae (MF9)

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions in the space provided. If additional space is required, you should use the lined page at the end of this booklet. The question number(s) must be clearly shown.
Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
The use of an electronic calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.

This document consists of **13** printed pages and **3** blank pages.

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1 There are 300 students at a music college. All students play exactly one of the guitar, the piano or the flute. The numbers of male and female students that play each of the instruments are given in the following table.

	Guitar	Piano	Flute
Female students	62	35	43
Male students	78	40	42

(i) Find the probability that a randomly chosen student at the college is a male who does not play the piano. [1]

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(ii) Determine whether the events 'a randomly chosen student is male' and 'a randomly chosen student does not play the piano' are independent, justifying your answer. [2]

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2 **(i)** How many different arrangements are there of the 9 letters in the word CORRIDORS? [2]

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(ii) How many different arrangements are there of the 9 letters in the word CORRIDORS in which the first letter is D and the last letter is R or O? [3]

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3 A sports team of 7 people is to be chosen from 6 attackers, 5 defenders and 4 midfielders. The team must include at least 3 attackers, at least 2 defenders and at least 1 midfielder.

(i) In how many different ways can the team of 7 people be chosen? [4]

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The team of 7 that is chosen travels to a match in two cars. A group of 4 travel in one car and a group of 3 travel in the other car.

(ii) In how many different ways can the team of 7 be divided into a group of 4 and a group of 3? [2]

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4 The heights of students at the Mainland college are normally distributed with mean 148 cm and standard deviation 8 cm.

(i) The probability that a Mainland student chosen at random has a height less than h cm is 0.67. Find the value of h. [3]

120 Mainland students are chosen at random.

(ii) Find the number of these students that would be expected to have a height within half a standard deviation of the mean. [4]

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5 Last Saturday, 200 drivers entering a car park were asked the time, in minutes, that it had taken them to travel from home to the car park. The results are summarised in the following cumulative frequency table.

Time (t minutes)	$t \leqslant 10$	$t \leqslant 20$	$t \leqslant 30$	$t \leqslant 50$	$t \leqslant 70$	$t \leqslant 90$
Cumulative frequency	16	50	106	146	176	200

(i) On the grid, draw a cumulative frequency graph to illustrate the data. [2]



(ii) Use your graph to estimate the median of the data. [1]

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(iii) For 80 of the drivers, the time taken was at least T minutes. Use your graph to estimate the value of T. [2]

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(iv) Calculate an estimate of the mean time taken by all 200 drivers to travel to the car park. [4]

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6 A box contains 3 red balls and 5 white balls. One ball is chosen at random from the box and is not returned to the box. A second ball is now chosen at random from the box.

(i) Find the probability that both balls chosen are red. [1]

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(ii) Show that the probability that the balls chosen are of different colours is $\frac{15}{28}$. [2]

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(iii) Given that the second ball chosen is red, find the probability that the first ball chosen is red. [2]

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The random variable X denotes the number of red balls chosen.

(iv) Draw up the probability distribution table for X. [2]

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

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7 A competition is taking place between two choirs, the Notes and the Classics. There is a large audience for the competition.

- 30% of the audience are Notes supporters.
- 45% of the audience are Classics supporters.
- The rest of the audience are not supporters of either of these choirs.
- No one in the audience supports both of these choirs.

(i) A random sample of 6 people is chosen from the audience.

(a) Find the probability that no more than 2 of the 6 people are Notes supporters. [3]

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(b) Find the probability that none of the 6 people support either of these choirs. [2]

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(ii) A random sample of 240 people is chosen from the audience. Use a suitable approximation to find the probability that fewer than 50 do not support either of the choirs. [5]

Additional Page

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

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