UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

MATHEMATICS **9709/63**

Paper 6 Probability & Statistics 1 **(S1)** **October/November 2010**

1 hour 15 minutes

Additional Materials: Answer Booklet/Paper
Graph Paper
List of Formulae (MF9)

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READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** the questions.
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.
Questions carrying smaller numbers of marks are printed earlier in the paper, and questions carrying larger numbers of marks later in the paper.

This document consists of **4** printed pages.

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[Turn over

1 Name the distribution and suggest suitable numerical parameters that you could use to model the weights in kilograms of female 18-year-old students. [2]

2 In a probability distribution the random variable X takes the value x with probability kx, where x takes values 1, 2, 3, 4, 5 only.

(i) Draw up a probability distribution table for X, in terms of k, and find the value of k. [3]

(ii) Find $\mathrm{E}(X)$. [2]

3 It was found that 68% of the passengers on a train used a cell phone during their train journey. Of those using a cell phone, 70% were under 30 years old, 25% were between 30 and 65 years old and the rest were over 65 years old. Of those not using a cell phone, 26% were under 30 years old and 64% were over 65 years old.

(i) Draw a tree diagram to represent this information, giving all probabilities as decimals. [2]

(ii) Given that one of the passengers is 45 years old, find the probability of this passenger using a cell phone during the journey. [3]

4 Delip measured the speeds, x km per hour, of 70 cars on a road where the speed limit is 60 km per hour. His results are summarised by $\Sigma(x - 60) = 245$.

(i) Calculate the mean speed of these 70 cars. [2]

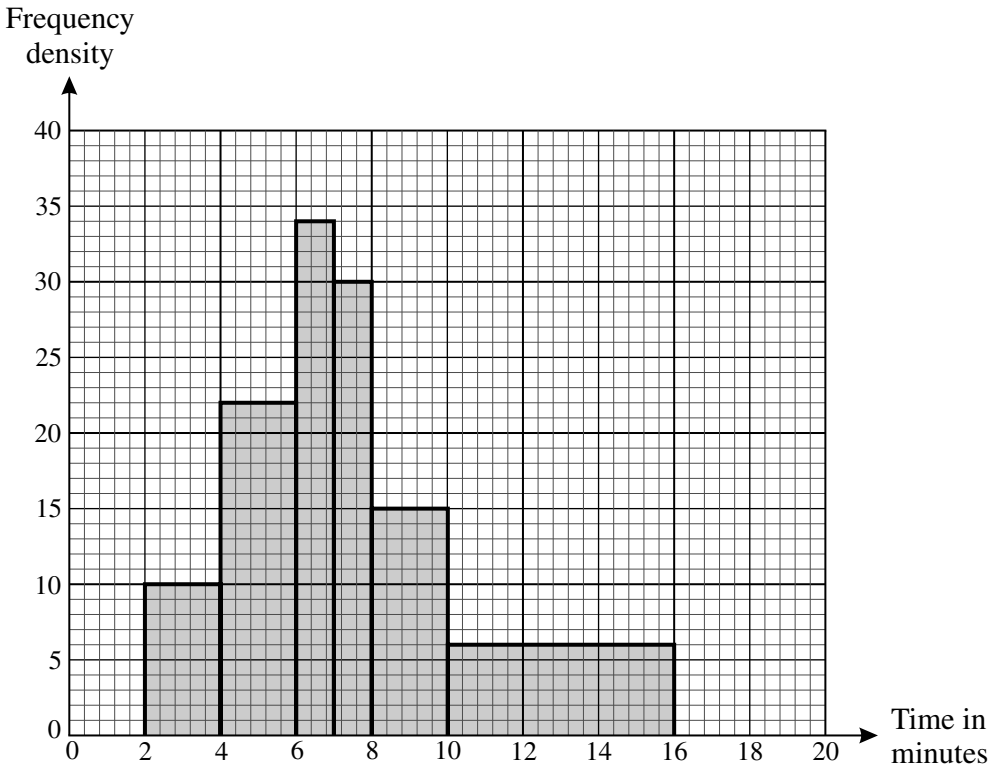
His friend Sachim used values of $(x - 50)$ to calculate the mean.

(ii) Find $\Sigma(x - 50)$. [2]

(iii) The standard deviation of the speeds is 10.6 km per hour. Calculate $\Sigma(x - 50)^2$. [2]

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5 The following histogram illustrates the distribution of times, in minutes, that some students spent taking a shower.



(i) Copy and complete the following frequency table for the data. [3]

Time (t minutes)	$2 < t \leqslant 4$	$4 < t \leqslant 6$	$6 < t \leqslant 7$	$7 < t \leqslant 8$	$8 < t \leqslant 10$	$10 < t \leqslant 16$
Frequency						

(ii) Calculate an estimate of the mean time to take a shower. [2]

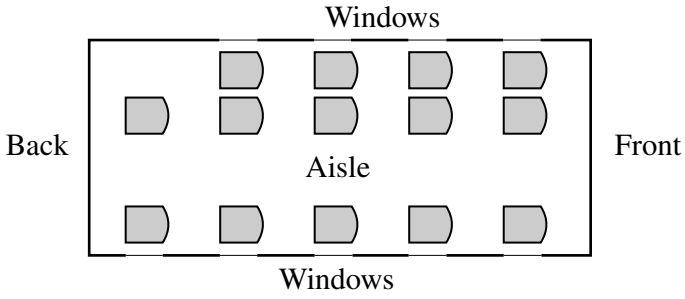
(iii) Two of these students are chosen at random. Find the probability that exactly one takes between 7 and 10 minutes to take a shower. [3]

[Questions 6 and 7 are printed on the next page.]

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[Turn over

6



A small aeroplane has 14 seats for passengers. The seats are arranged in 4 rows of 3 seats and a back row of 2 seats (see diagram). 12 passengers board the aeroplane.

(i) How many possible seating arrangements are there for the 12 passengers? Give your answer correct to 3 significant figures. [2]

These 12 passengers consist of 2 married couples (Mr and Mrs Lin and Mr and Mrs Brown), 5 students and 3 business people.

(ii) The 3 business people sit in the front row. The 5 students each sit at a window seat. Mr and Mrs Lin sit in the same row on the same side of the aisle. Mr and Mrs Brown sit in another row on the same side of the aisle. How many possible seating arrangements are there? [4]

(iii) If, instead, the 12 passengers are seated randomly, find the probability that Mrs Lin sits directly behind a student and Mrs Brown sits in the front row. [4]

7 The times spent by people visiting a certain dentist are independent and normally distributed with a mean of 8.2 minutes. 79% of people who visit this dentist have visits lasting less than 10 minutes.

(i) Find the standard deviation of the times spent by people visiting this dentist. [3]

(ii) Find the probability that the time spent visiting this dentist by a randomly chosen person deviates from the mean by more than 1 minute. [3]

(iii) Find the probability that, of 6 randomly chosen people, more than 2 have visits lasting longer than 10 minutes. [3]

(iv) Find the probability that, of 35 randomly chosen people, fewer than 16 have visits lasting less than 8.2 minutes. [5]

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