CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Subsidiary Level

MATHEMATICS **8709/6**

PAPER 6 Probability and Statistics 1 **(S1)**

OCTOBER/NOVEMBER SESSION 2001 1 hour 15 minutes

Additional materials:
   Answer paper
   Graph paper
   List of Formulae (MF9)

TIME   1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

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.

INFORMATION FOR CANDIDATES

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.

The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

This question paper consists of 3 printed pages and 1 blank page.

University of Cambridge

1 The age at which a child first walked (to the nearest month) was recorded for 8 children. The results were as follows.

$$12 \quad 11 \quad 16 \quad 19 \quad 10 \quad 12 \quad 12 \quad 13$$

Calculate the mean and standard deviation of the data. [3]

2 **(a)** A competition involves listing *in order* the best 6 features of a certain car. There are 10 features to choose from (e.g. power steering, air bags, air conditioning etc.). Peter makes a list of 6 features. How many different lists could Peter make? [2]

(b) The word MOBILE consists of the three consonants M, B, L and the three vowels O, I, E. How many different arrangements of all the letters of the word MOBILE are possible if the vowels must be next to each other? [3]

3 A lecturer wishes to give a message to a student. The probabilities that she uses e-mail, letter or personal contact are 0.4, 0.1 and 0.5 respectively. She uses only one method. The probabilities of the student receiving the message if the lecturer uses e-mail, letter or personal contact are 0.6, 0.8 and 1 respectively.

(i) Find the probability that the student receives the message. [3]

(ii) Given that the student receives the message, find the conditional probability that he received it via e-mail. [3]

4 A survey was made of the number of people attending church services on one particular Sunday morning. A random sample of 500 churches was taken. The results are as follows.

Number of people attending	1–20	21–40	41–60	61–100	101–200	201–300
Number of churches	46	110	122	100	86	36

(i) Draw a histogram on graph paper to represent these results. [5]

(ii) Find the probability that, in each of 3 churches chosen at random from the sample, the number of people attending was less than 61. [2]

5 The waiting time in a doctor's surgery is normally distributed with mean 15 minutes and standard deviation 4.2 minutes.

(i) Find the probability that a patient has to wait less than 10 minutes to see the doctor. [3]

(ii) 10% of people wait longer than T minutes. Find T. [3]

(iii) In a given week, 200 people attend the surgery. Estimate the number of these who wait more than 20 minutes. [3]

6   65% of all watches sold by a shop have a digital display and 35% have an analog display.

   (i) Find the probability that, out of the next 12 customers who buy a watch, fewer than 10 choose
       one with a digital display.   [4]

   (ii) Use a suitable approximation to find the probability that, out of the next 120 customers who buy
        a watch, fewer than 70 choose one with a digital display.   [5]

7   A bag contains 7 orange balls and 3 blue balls. 4 balls are selected at random from the bag, without
     replacement. Let X denote the number of blue balls selected.

   (i) Show that $P(X = 0) = \frac{1}{6}$ and $P(X = 1) = \frac{1}{2}$.   [4]

   (ii) Construct a table to show the probability distribution of X.   [3]

   (iii) Find the mean and variance of X.   [4]

BLANK PAGE