CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Advanced Subsidiary Level
General Certificate of Education Advanced Level
Advanced International Certificate of Education

MATHEMATICS **9709/6**

STATISTICS **0390/6**

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

MAY/JUNE SESSION 2002

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

[Turn over

1 Events A and B are such that $P(A) = 0.3$, $P(B) = 0.8$ and $P(A \text{ and } B) = 0.4$. State, giving a reason in each case, whether events A and B are

(i) independent, [2]

(ii) mutually exclusive. [2]

2 The manager of a company noted the times spent in 80 meetings. The results were as follows.

Time (t minutes)	$0 < t \leqslant 15$	$15 < t \leqslant 30$	$30 < t \leqslant 60$	$60 < t \leqslant 90$	$90 < t \leqslant 120$
Number of meetings	4	7	24	38	7

Draw a cumulative frequency graph and use this to estimate the median time and the interquartile range. [6]

3 A fair cubical die with faces numbered 1, 1, 1, 2, 3, 4 is thrown and the score noted. The area A of a square of side equal to the score is calculated, so, for example, when the score on the die is 3, the value of A is 9.

(i) Draw up a table to show the probability distribution of A. [3]

(ii) Find $E(A)$ and $\text{Var}(A)$. [4]

4 **(i)** In a spot check of the speeds $x\,\text{km h}^{-1}$ of 30 cars on a motorway, the data were summarised by $\Sigma(x - 110) = -47.2$ and $\Sigma(x - 110)^2 = 5460$. Calculate the mean and standard deviation of these speeds. [4]

(ii) On another day the mean speed of cars on the motorway was found to be $107.6\,\text{km h}^{-1}$ and the standard deviation was $13.8\,\text{km h}^{-1}$. Assuming these speeds follow a normal distribution and that the speed limit is $110\,\text{km h}^{-1}$, find what proportion of cars exceed the speed limit. [3]

5 The digits of the number 1223678 can be rearranged to give many different 7-digit numbers. Find how many different 7-digit numbers can be made if

(i) there are no restrictions on the order of the digits, [2]

(ii) the digits 1, 3, 7 (in any order) are next to each other, [3]

(iii) these 7-digit numbers are even. [3]

6 **(i)** In a normal distribution with mean μ and standard deviation σ, $P(X > 3.6) = 0.5$ and $P(X > 2.8) = 0.6554$. Write down the value of μ, and calculate the value of σ. [4]

(ii) If four observations are taken at random from this distribution, find the probability that at least two observations are greater than 2.8. [4]

7 **(i)** A garden shop sells polyanthus plants in boxes, each box containing the same number of plants. The number of plants per box which produce yellow flowers has a binomial distribution with mean 11 and variance 4.95.

(a) Find the number of plants per box. [4]

(b) Find the probability that a box contains exactly 12 plants which produce yellow flowers. [2]

(ii) Another garden shop sells polyanthus plants in boxes of 100. The shop's advertisement states that the probability of any polyanthus plant producing a pink flower is 0.3. Use a suitable approximation to find the probability that a box contains fewer than 35 plants which produce pink flowers. [4]

BLANK PAGE