

**CAMBRIDGE 'A' LEVEL PROGRAMME  
AS TRIAL EXAMINATION MARCH/APRIL 2007  
(June 2006 Intake)**

**Monday**

**2 April 2007**

**1.30 pm – 2.45 pm**

**MATHEMATICS**

**9709/6**

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

**1 hour 15 minutes**

Additional materials: Answer Booklet/Paper  
Graph Paper  
List of formulae (MF9)

**READ THESE INSTRUCTIONS FIRST**

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.  
Write your name and class on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
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.

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 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 document consists of 4 printed pages.

1. Find the number of different arrangements of the six letters in the word ELEVEN in which

(a) the first letter is E and the last letter is N. [2]

(b) all the E's are not together. [2]

2. Avary and Penn Solicitors monitored the time spent on consultations with a random sample of 120 clients. The times, to the nearest minute, are summarized in the following table.

Time	Number of Clients
10-14	2
15-19	5
20-24	17
25-29	33
30-34	27
35-44	25
45-59	7
60-89	3
90-109	1

(a) Draw a cumulative frequency polygon. [2]

(b) Estimate the median and interquartile range. [2]

(c) Draw a box plot and comment on the type of distribution. [2]

3. When a certain type of cell is subjected to radiation, the cell may die, survive as a single cell or divide into two cells with probabilities  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{6}$  respectively.

Two cells are independently subjected to radiation. The random variable X represents the total numbers of cells in existence after this experiment.

(a) Find the probability distribution of X. [3]

(b) Evaluate  $E(X)$ . [2]

(c) Find  $\text{Var}(X)$ . [2]

4. Sally takes examinations in Mathematics, French and History. The probability that she passes Mathematics is 0.7 and the corresponding probabilities for French and History are 0.8 and 0.6 respectively. Given that her performances in each are independent, find the probability that Sally

(a) fails all three examinations, [2]

(b) fail just one examination. [3]

Given that Sally fails just one examination, find the probability that she fails History. [2]

5. In a germination experiment, two hundred rows of seeds, with ten seeds per row, were incubated. The frequency distribution of the number of seeds which germinated per row is shown below.

Number of seeds germinated	Frequency
0	4
1	10
2	16
3	28
4	34
5	44
6	32
7	16
8	10
9	6
10	0

- (a) Calculate the mean and the standard deviation of the number of seeds germinating per row. [4]

For another fifty rows, an analysis shows that the mean is 4.4 seeds and the standard deviation is 2.2 seeds.

- (b) Determine the mean, and correct to 2 decimal places, the standard deviation for the 250 rows. [4]

[Turn over

6. In a large population the proportion having blood group  $A$  is 35%. Specimens of blood from the first five people attending a clinic are to be tested. It can be assumed that these five people are a random sample from the population. The random variable  $X$  denotes the number of people in the sample who are found to have blood group  $A$ .
- (a) Show that  $P(X \leq 2) = 0.765$ , correct to 3 decimal places. [2]
  - (b) Three such samples of five people are taken. Find the probability that each of these three samples has more than two people with blood group  $A$ . [3]
  - (c) One hundred such samples of five people are taken. Using a suitable approximation, find the probability that the number of these samples that contain two or fewer people with blood group  $A$  will be at least 70. [4]
7. A college student investigated how long he actually had to spend on assignments, which were nominally for half-hour periods. He found that the times were approximately normally distributed, with mean 35 minutes and standard deviation 8 minutes. Using this model, and assuming independence between assignments, find
- (a) the probability that one particular assignment will take less than 25 minutes, [2]
  - (b) the time in which 90% of all assignments can be completed, [3]
  - (c) the probability that three assignments each take more than 40 minutes. [4]