

**CAMBRIDGE 'A' LEVEL PROGRAMME**  
**AS TRIAL EXAMINATION AUGUST/SEPTEMBER 2007**  
(January 2007 & March 2007 Intake)

**Wednesday**

**29 August 2007**

**2.30 pm – 3.45 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. The depth of water in a lake was measured at 15 different points on the surface of the lake. The depths,  $x$  metres, are summarised by  $\sum x = 150$  and  $\sum x^2 = 1860$ . Find the mean and variance of the depths. [3]

2. The table below shows the lifespan of a sample of batteries.

Lifespan (to the nearest hour)	Frequency
620 - 639	4
640 - 659	8
660 - 679	16
680 - 699	37
700 - 719	40
720 - 739	34
740 - 759	20
760 - 779	15
780 - 799	12

Draw a histogram to represent the data and state the mode. [4]

3. A student collected some data on the heights,  $x$  cm, of plants of a particular species. She chose to represent the data in stem and leaf diagram, as shown below.

Key 1 | 2 represents 12 cm

1		1	2	2	3	4	4	4	5	6	7	7	9
2		1	1	1	2	5	5	7	8	8	9		
3		1	2	2	5	5	9	9					
4		1	3	4	5	6							

- (a) Calculate the interquartile range. [3]  
 (b) Construct a box-and-whisker plot. [2]

- 4.(a) The random variable  $X$  is normally distributed with mean 10 and standard deviation  $\sigma$ . It is given that  $P(X > 11) = 0.35$ . Find the standard deviation. [3]
- (b) A normal distribution has mean  $\mu$  and standard deviation  $\sigma$ . If 1000 observations are taken from this distribution, how many would you expect to be between  $\mu - 2\sigma$  and  $\mu + 2\sigma$ ? [2]
5. A golfer observes that when playing a particular hole at his local course, he hits a straight drive on 80% of the occasions when the weather is not windy but only 30% of the occasions when the weather is windy. Local records suggest that the weather is windy on 55% of all days.
- (a) Show that the probability that on a randomly chosen day, the golfer will hit a straight drive at the hole is 0.525. [2]
- (b) Given that he fails to hit a straight drive at the hole, calculate the probability that the weather is windy. [3]
6. Two red balls and two white balls are placed in a bag. Balls are drawn one by one at random and without replacement. The random variable  $X$  is the number of white balls drawn before the first red ball is drawn.
- (a) Show that  $P(X = 1) = \frac{1}{3}$  [2]
- (b) Draw up the probability distribution table for  $X$ . [3]
- (c) Find  $E(X)$  and show that  $Var(X) = \frac{5}{9}$  [4]
- 7.(a) A team of rescue volunteers for flood victims to be set up. There are 7 doctors, 11 nurses and 10 workers volunteering their services. Find the number of ways the team can be formed if
- (i) 5 doctors, 7 nurses and 9 workers are required, [2]
- (ii) 3 doctors, 8 nurses and 7 workers are required such that Chan and Yoga from the group of workers and May and Hazreen from the group of doctors must be included in the team. [2]
- (b) In how many ways can 7 teachers and 5 students stand in a straight line if
- (i) there are no restrictions. [2]
- (ii) no two students stand next to each other. [3]

8. A reader of a magazine enters for a competition in the magazine, in which the competitors have to choose the correct answers to a number of questions. There are five suggested answers for each question, but the reader is completely unskillful and selects an answer at random to each question, so that, for each question, the probability of choosing the correct answer is  $\frac{1}{5}$ .
- (a) For a competition with 12 questions, find the probability of the reader getting more than 2 correct answers. [4]
- (b) For a competition with 100 questions, use a suitable approximation to show that the probability of the reader getting more than 26 correct answers is 0.052. [6]