

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

**MATHEMATICS**

**9709/06**

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

October/November 2006

**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 Centre number, candidate number and name 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.

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

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

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.

At the end of the examination, fasten all your work securely together.

This document consists of **3** printed pages and **1** blank page.



- 1 The weights of 30 children in a class, to the nearest kilogram, were as follows.

50	45	61	53	55	47	52	49	46	51
60	52	54	47	57	59	42	46	51	53
56	48	50	51	44	52	49	58	55	45

Construct a grouped frequency table for these data such that there are five equal class intervals with the first class having a lower boundary of 41.5 kg and the fifth class having an upper boundary of 61.5 kg. [4]

- 2 The discrete random variable  $X$  has the following probability distribution.

$x$	0	1	2	3	4
$P(X = x)$	0.26	$q$	$3q$	0.05	0.09

- (i) Find the value of  $q$ . [2]
- (ii) Find  $E(X)$  and  $\text{Var}(X)$ . [3]
- 3 In a survey, people were asked how long they took to travel to and from work, on average. The median time was 3 hours 36 minutes, the upper quartile was 4 hours 42 minutes and the interquartile range was 3 hours 48 minutes. The longest time taken was 5 hours 12 minutes and the shortest time was 30 minutes.
- (i) Find the lower quartile. [2]
- (ii) Represent the information by a box-and-whisker plot, using a scale of 2 cm to represent 60 minutes. [4]
- 4 Two fair dice are thrown.
- (i) Event  $A$  is ‘the scores differ by 3 or more’. Find the probability of event  $A$ . [3]
- (ii) Event  $B$  is ‘the product of the scores is greater than 8’. Find the probability of event  $B$ . [2]
- (iii) State with a reason whether events  $A$  and  $B$  are mutually exclusive. [2]
- 5 (i) Give an example of a variable in real life which could be modelled by a normal distribution. [1]
- (ii) The random variable  $X$  is normally distributed with mean  $\mu$  and variance 21.0. Given that  $P(X > 10.0) = 0.7389$ , find the value of  $\mu$ . [3]
- (iii) If 300 observations are taken at random from the distribution in part (ii), estimate how many of these would be greater than 22.0. [4]

- 6 Six men and three women are standing in a supermarket queue.
- (i) How many possible arrangements are there if there are no restrictions on order? [2]
- (ii) How many possible arrangements are there if no two of the women are standing next to each other? [4]
- (iii) Three of the people in the queue are chosen to take part in a customer survey. How many different choices are possible if at least one woman must be included? [3]
- 7 A manufacturer makes two sizes of elastic bands: large and small. 40% of the bands produced are large bands and 60% are small bands. Assuming that each pack of these elastic bands contains a random selection, calculate the probability that, in a pack containing 20 bands, there are
- (i) equal numbers of large and small bands, [2]
- (ii) more than 17 small bands. [3]

An office pack contains 150 elastic bands.

- (iii) Using a suitable approximation, calculate the probability that the number of small bands in the office pack is between 88 and 97 inclusive. [6]

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