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

MATHEMATICS **9709/63**

Paper 6 Probability & Statistics 1 **(S1)** **May/June 2010**

1 hour 15 minutes

Additional Materials: Answer Booklet/Paper
Graph Paper
List of Formulae (MF9)

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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.
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.

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 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.

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

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1 A bottle of sweets contains 13 red sweets, 13 blue sweets, 13 green sweets and 13 yellow sweets. 7 sweets are selected at random. Find the probability that exactly 3 of them are red. [3]

2 The heights, x cm, of a group of 82 children are summarised as follows.

$$\Sigma(x - 130) = -287, \qquad \text{standard deviation of } x = 6.9.$$

(i) Find the mean height. [2]

(ii) Find $\Sigma(x - 130)^2$. [2]

3 Christa takes her dog for a walk every day. The probability that they go to the park on any day is 0.6. If they go to the park there is a probability of 0.35 that the dog will bark. If they do not go to the park there is a probability of 0.75 that the dog will bark.

(i) Find the probability that they go to the park on more than 5 of the next 7 days. [2]

(ii) Find the probability that the dog barks on any particular day. [2]

(iii) Find the variance of the number of times they go to the park in 30 days. [1]

4 Three identical cans of cola, 2 identical cans of green tea and 2 identical cans of orange juice are arranged in a row. Calculate the number of arrangements if

(i) the first and last cans in the row are the same type of drink, [3]

(ii) the 3 cans of cola are all next to each other and the 2 cans of green tea are not next to each other. [5]

5 Set A consists of the ten digits 0, 0, 0, 0, 0, 0, 2, 2, 2, 4.

Set B consists of the seven digits 0, 0, 0, 0, 2, 2, 2.

One digit is chosen at random from each set. The random variable X is defined as the sum of these two digits.

(i) Show that $\mathrm{P}(X = 2) = \frac{3}{7}$. [2]

(ii) Tabulate the probability distribution of X. [2]

(iii) Find $\mathrm{E}(X)$ and $\mathrm{Var}(X)$. [3]

(iv) Given that $X = 2$, find the probability that the digit chosen from set A was 2. [2]

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6 The lengths of some insects of the same type from two countries, X and Y, were measured. The stem-and-leaf diagram shows the results.

Country X		Country Y	
(10)	9 7 6 6 6 4 4 4 3 2	80	
(18)	8 8 8 7 7 6 6 5 5 5 4 4 3 3 3 2 2 0	81	1 1 2 2 3 3 3 5 5 6 7 8 9 (13)
(16)	9 9 9 8 8 7 7 6 5 5 3 2 2 1 0 0	82	0 0 1 2 3 3 3 q 4 5 6 6 7 8 8 (15)
(16)	8 7 6 5 5 5 3 3 2 2 2 1 1 1 0 0	83	0 1 2 2 4 4 4 4 5 5 6 6 7 7 7 8 9 (17)
(11)	8 7 6 5 5 4 4 3 3 1 1	84	0 0 1 2 4 4 5 5 6 6 7 7 7 8 9 (15)
		85	1 2 r 3 3 5 5 6 6 7 8 8 (12)
		86	0 1 2 2 3 5 5 5 8 9 9 (11)

Key: 5 | 81 | 3 means an insect from country X has length 0.815 cm and an insect from country Y has length 0.813 cm.

(i) Find the median and interquartile range of the lengths of the insects from country X. [2]

(ii) The interquartile range of the lengths of the insects from country Y is 0.028 cm. Find the values of q and r. [2]

(iii) Represent the data by means of a pair of box-and-whisker plots in a single diagram on graph paper. [4]

(iv) Compare the lengths of the insects from the two countries. [2]

7 The heights that children of a particular age can jump have a normal distribution. On average, 8 children out of 10 can jump a height of more than 127 cm, and 1 child out of 3 can jump a height of more than 135 cm.

(i) Find the mean and standard deviation of the heights the children can jump. [5]

(ii) Find the probability that a randomly chosen child will **not** be able to jump a height of 145 cm. [3]

(iii) Find the probability that, of 8 randomly chosen children, at least 2 will be able to jump a height of more than 135 cm. [3]

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