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

MATHEMATICS **9709/62**

Paper 6 Probability & Statistics 1 **(S1)** **May/June 2012**

1 hour 15 minutes

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

* 4 4 2 4 0 0 5 2 8 8 *

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.

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1 The ages, x years, of 150 cars are summarised by $\Sigma x = 645$ and $\Sigma x^2 = 8287.5$. Find $\Sigma(x - \bar{x})^2$, where $\bar{x}$ denotes the mean of x. [4]

2 The random variable X has the probability distribution shown in the table.

x	2	4	6
$P(X = x)$	0.5	0.4	0.1

Two independent values of X are chosen at random. The random variable Y takes the value 0 if the two values of X are the same. Otherwise the value of Y is the larger value of X minus the smaller value of X.

(i) Draw up the probability distribution table for Y. [4]

(ii) Find the expected value of Y. [1]

3 In Restaurant Bijoux 13% of customers rated the food as 'poor', 22% of customers rated the food as 'satisfactory' and 65% rated it as 'good'. A random sample of 12 customers who went for a meal at Restaurant Bijoux was taken.

(i) Find the probability that more than 2 and fewer than 12 of them rated the food as 'good'. [3]

On a separate occasion, a random sample of n customers who went for a meal at the restaurant was taken.

(ii) Find the smallest value of n for which the probability that at least 1 person will rate the food as 'poor' is greater than 0.95. [3]

4 The back-to-back stem-and-leaf diagram shows the values taken by two variables A and B.

	A		B	
(3)	3 1 0	15	1 3 3 5	(4)
(2)	4 1	16	2 2 3 4 4 5 7 7 7 8	(10)
(3)	8 3 3	17	0 1 3 3 3 4 6 6 7 9 9	(11)
(12)	9 8 8 6 5 5 4 3 2 1 1 0	18	2 4 7	(3)
(8)	9 9 8 8 6 5 4 2	19	1 5	(2)
(5)	9 8 7 1 0	20	4	(1)

Key: 4 | 16 | 7 means $A = 0.164$ and $B = 0.167$.

(i) Find the median and the interquartile range for variable A. [3]

(ii) You are given that, for variable B, the median is 0.171, the upper quartile is 0.179 and the lower quartile is 0.164. Draw box-and-whisker plots for A and B in a single diagram on graph paper. [3]

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5 An English examination consists of 8 questions in Part *A* and 3 questions in Part *B*. Candidates must choose 6 questions. The order in which questions are chosen does not matter. Find the number of ways in which the 6 questions can be chosen in each of the following cases.

(i) There are no restrictions on which questions can be chosen. [1]

(ii) Candidates must choose at least 4 questions from Part *A*. [3]

(iii) Candidates must either choose both question 1 and question 2 in Part *A*, or choose neither of these questions. [3]

6 A box of biscuits contains 30 biscuits, some of which are wrapped in gold foil and some of which are unwrapped. Some of the biscuits are chocolate-covered. 12 biscuits are wrapped in gold foil, and of these biscuits, 7 are chocolate-covered. There are 17 chocolate-covered biscuits in total.

(i) Copy and complete the table below to show the number of biscuits in each category. [2]

	Wrapped in gold foil	Unwrapped	Total
Chocolate-covered			
Not chocolate-covered			
Total			30

A biscuit is selected at random from the box.

(ii) Find the probability that the biscuit is wrapped in gold foil. [1]

The biscuit is returned to the box. An unwrapped biscuit is then selected at random from the box.

(iii) Find the probability that the biscuit is chocolate-covered. [1]

The biscuit is returned to the box. A biscuit is then selected at random from the box.

(iv) Find the probability that the biscuit is unwrapped, given that it is chocolate-covered. [1]

The biscuit is returned to the box. Nasir then takes 4 biscuits without replacement from the box.

(v) Find the probability that he takes exactly 2 wrapped biscuits. [4]

7 The times taken to play Beethoven's Sixth Symphony can be assumed to have a normal distribution with mean 41.1 minutes and standard deviation 3.4 minutes. Three occasions on which this symphony is played are chosen at random.

(i) Find the probability that the symphony takes longer than 42 minutes to play on exactly 1 of these occasions. [4]

The times taken to play Beethoven's Fifth Symphony can also be assumed to have a normal distribution. The probability that the time is less than 26.5 minutes is 0.1, and the probability that the time is more than 34.6 minutes is 0.05.

(ii) Find the mean and standard deviation of the times to play this symphony. [5]

(iii) Assuming that the times to play the two symphonies are independent of each other, find the probability that, when both symphonies are played, both of the times are less than 34.6 minutes. [4]

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