Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

MATHEMATICS **9709/63**

Paper 6 Probability & Statistics 1 **(S1)** **October/November 2014**

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

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 Packets of tea are labelled as containing 250 g. The actual weight of tea in a packet has a normal distribution with mean 260 g and standard deviation σ g. Any packet with a weight less than 250 g is classed as 'underweight'. Given that 1% of packets of tea are underweight, find the value of σ. [3]

2 A traffic camera measured the speeds, x kilometres per hour, of 8 cars travelling along a certain street, with the following results.

62.7 59.6 64.2 61.5 68.3 66.9 62.0 62.3

(i) Find $\Sigma(x - 62)$. [1]

(ii) Find $\Sigma(x - 62)^2$. [1]

(iii) Find the mean and variance of the speeds of the 8 cars. [3]

3 The number of books read by members of a book club each year has the binomial distribution B(12, 0.7).

(i) State the greatest number of books that could be read by a member of the book club in a particular year and find the probability that a member reads this number of books. [2]

(ii) Find the probability that a member reads fewer than 10 books in a particular year. [3]

4 A random sample of 25 people recorded the number of glasses of water they drank in a particular week. The results are shown below.

23	19	32	14	25
22	26	36	45	42
47	28	17	38	15
46	18	26	22	41
19	21	28	24	30

(i) Draw a stem-and-leaf diagram to represent the data. [3]

(ii) On graph paper draw a box-and-whisker plot to represent the data. [5]

5 Gem stones from a certain mine have weights, X grams, which are normally distributed with mean 1.9 g and standard deviation 0.55 g. These gem stones are sorted into three categories for sale depending on their weights, as follows.

Small: under 1.2 g Medium: between 1.2 g and 2.5 g Large: over 2.5 g

(i) Find the proportion of gem stones in each of these three categories. [5]

(ii) Find the value of k such that $P(k < X < 2.5) = 0.8$. [4]

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6 **(a)** Seven fair dice each with faces marked 1, 2, 3, 4, 5, 6 are thrown and placed in a line. Find the number of possible arrangements where the sum of the numbers at each end of the line add up to 4. [3]

(b) Find the number of ways in which 9 different computer games can be shared out between Wainah, Jingyi and Hebe so that each person receives an odd number of computer games. [6]

7 A box contains 2 green apples and 2 red apples. Apples are taken from the box, one at a time, without replacement. When both red apples have been taken, the process stops. The random variable X is the number of apples which have been taken when the process stops.

(i) Show that $\mathrm{P}(X = 3) = \frac{1}{3}$. [3]

(ii) Draw up the probability distribution table for X. [3]

Another box contains 2 yellow peppers and 5 orange peppers. Three peppers are taken at random from the box without replacement.

(iii) Given that at least 2 of the peppers taken from the box are orange, find the probability that all 3 peppers are orange. [5]

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