Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

MATHEMATICS **9709/62**

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 The 50 members of a club include both the club president and the club treasurer. All 50 members want to go on a coach tour, but the coach only has room for 45 people. In how many ways can 45 members be chosen if both the club president and the club treasurer must be included? [3]

2 Find the number of different ways that 6 boys and 4 girls can stand in a line if

(i) all 6 boys stand next to each other, [3]

(ii) no girl stands next to another girl. [3]

3 **(i)** Four fair six-sided dice, each with faces marked 1, 2, 3, 4, 5, 6, are thrown. Find the probability that the numbers shown on the four dice add up to 5. [3]

(ii) Four fair six-sided dice, each with faces marked 1, 2, 3, 4, 5, 6, are thrown on 7 occasions. Find the probability that the numbers shown on the four dice add up to 5 on exactly 1 or 2 of the 7 occasions. [4]

4 Sharik attempts a multiple choice revision question on-line. There are 3 suggested answers, one of which is correct. When Sharik chooses an answer the computer indicates whether the answer is right or wrong. Sharik first chooses one of the three suggested answers at random. If this answer is wrong he has a second try, choosing an answer at random from the remaining 2. If this answer is also wrong Sharik then chooses the remaining answer, which must be correct.

(i) Draw a fully labelled tree diagram to illustrate the various choices that Sharik can make until the computer indicates that he has answered the question correctly. [4]

(ii) The random variable X is the number of attempts that Sharik makes up to and including the one that the computer indicates is correct. Draw up the probability distribution table for X and find $\mathrm{E}(X)$. [4]

5 **(a)** The time, X hours, for which people sleep in one night has a normal distribution with mean 7.15 hours and standard deviation 0.88 hours.

(i) Find the probability that a randomly chosen person sleeps for less than 8 hours in a night. [2]

(ii) Find the value of q such that $\mathrm{P}(X < q) = 0.75$. [3]

(b) The random variable Y has the distribution $\mathrm{N}(\mu, \sigma^2)$, where $2\sigma = 3\mu$ and $\mu \neq 0$. Find $\mathrm{P}(Y > 4\mu)$. [3]

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6 On a certain day in spring, the heights of 200 daffodils are measured, correct to the nearest centimetre. The frequency distribution is given below.

Height (cm)	4 – 10	11 – 15	16 – 20	21 – 25	26 – 30
Frequency	22	32	78	40	28

(i) Draw a cumulative frequency graph to illustrate the data. [4]

(ii) 28% of these daffodils are of height h cm or more. Estimate h. [2]

(iii) You are given that the estimate of the mean height of these daffodils, calculated from the table, is 18.39 cm. Calculate an estimate of the standard deviation of the heights of these daffodils. [3]

7 In Marumbo, three quarters of the adults own a cell phone.

(i) A random sample of 8 adults from Marumbo is taken. Find the probability that the number of adults who own a cell phone is between 4 and 6 inclusive. [3]

(ii) A random sample of 160 adults from Marumbo is taken. Use an approximation to find the probability that more than 114 of them own a cell phone. [5]

(iii) Justify the use of your approximation in part **(ii)**. [1]

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