Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

MATHEMATICS **9709/61**

Paper 6 Probability & Statistics 1 **(S1)** **May/June 2014**

1 hour 15 minutes

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

2807231189

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 petrol consumption of a certain type of car has a normal distribution with mean 24 kilometres per litre and standard deviation 4.7 kilometres per litre. Find the probability that the petrol consumption of a randomly chosen car of this type is between 21.6 kilometres per litre and 28.7 kilometres per litre. [4]

2 Lengths of a certain type of white radish are normally distributed with mean μ cm and standard deviation σ cm. 4% of these radishes are longer than 12 cm and 32% are longer than 9 cm. Find μ and σ. [5]

3 **(i)** State three conditions which must be satisfied for a situation to be modelled by a binomial distribution. [2]

George wants to invest some of his monthly salary. He invests a certain amount of this every month for 18 months. For each month there is a probability of 0.25 that he will buy shares in a large company, there is a probability of 0.15 that he will buy shares in a small company and there is a probability of 0.6 that he will invest in a savings account.

(ii) Find the probability that George will buy shares in a small company in at least 3 of these 18 months. [3]

4 A book club sends 6 paperback and 2 hardback books to Mrs Hunt. She chooses 4 of these books at random to take with her on holiday. The random variable X represents the number of paperback books she chooses.

(i) Show that the probability that she chooses exactly 2 paperback books is $\frac{3}{14}$. [2]

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

(iii) You are given that $\mathrm{E}(X) = 3$. Find $\mathrm{Var}(X)$. [2]

5 Playground equipment consists of swings (S), roundabouts (R), climbing frames (C) and play-houses (P). The numbers of pieces of equipment in each of 3 playgrounds are as follows.

Playground X	Playground Y	Playground Z
$3S$, $2R$, $4P$	$6S$, $3R$, $1C$, $2P$	$8S$, $3R$, $4C$, $1P$

Each day Nur takes her child to one of the playgrounds. The probability that she chooses playground X is $\frac{1}{4}$. The probability that she chooses playground Y is $\frac{1}{4}$. The probability that she chooses playground Z is $\frac{1}{2}$. When she arrives at the playground, she chooses one piece of equipment at random.

(i) Find the probability that Nur chooses a play-house. [4]

(ii) Given that Nur chooses a climbing frame, find the probability that she chose playground Y. [4]

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6 Find the number of different ways in which all 8 letters of the word TANZANIA can be arranged so that

(i) all the letters A are together, [2]

(ii) the first letter is a consonant (T, N, Z), the second letter is a vowel (A, I), the third letter is a consonant, the fourth letter is a vowel, and so on alternately. [3]

4 of the 8 letters of the word TANZANIA are selected. How many possible selections contain

(iii) exactly 1 N and 1 A, [2]

(iv) exactly 1 N? [3]

7 A typing test is taken by 111 people. The numbers of typing errors they make in the test are summarised in the table below.

Number of typing errors	1 – 5	6 – 20	21 – 35	36 – 60	61 – 80
Frequency	24	9	21	15	42

(i) Draw a histogram on graph paper to represent this information. [5]

(ii) Calculate an estimate of the mean number of typing errors for these 111 people. [3]

(iii) State which class contains the lower quartile and which class contains the upper quartile. Hence find the least possible value of the interquartile range. [3]

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