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

MATHEMATICS **9709/63**

Paper 6 Probability & Statistics 1 **(S1)** **October/November 2013**

1 hour 15 minutes

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

* 7 6 7 9 0 8 7 5 9 9 *

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.

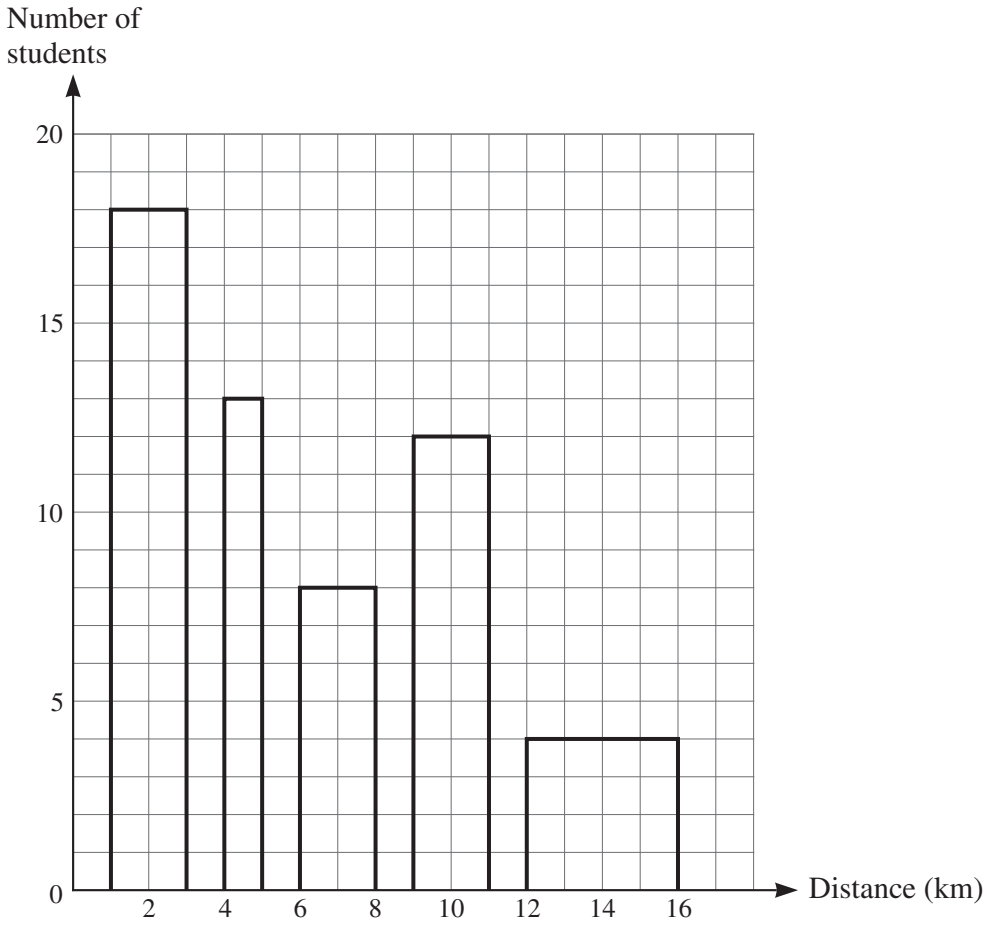
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.
Questions carrying smaller numbers of marks are printed earlier in the paper, and questions carrying larger numbers of marks later in the paper.

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1 The distance of a student's home from college, correct to the nearest kilometre, was recorded for each of 55 students. The distances are summarised in the following table.

Distance from college (km)	1 – 3	4 – 5	6 – 8	9 – 11	12 – 16
Number of students	18	13	8	12	4

Dominic is asked to draw a histogram to illustrate the data. Dominic's diagram is shown below.



Give two reasons why this is not a correct histogram. [2]

2 A factory produces flower pots. The base diameters have a normal distribution with mean 14 cm and standard deviation 0.52 cm. Find the probability that the base diameters of exactly 8 out of 10 randomly chosen flower pots are between 13.6 cm and 14.8 cm. [5]

3 In a large consignment of mangoes, 15% of mangoes are classified as small, 70% as medium and 15% as large.

(i) Yue-chen picks 14 mangoes at random. Find the probability that fewer than 12 of them are medium or large. [3]

(ii) Yue-chen picks n mangoes at random. The probability that none of these n mangoes is small is at least 0.1. Find the largest possible value of n. [3]

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4 Barry weighs 20 oranges and 25 lemons. For the oranges, the mean weight is 220 g and the standard deviation is 32 g. For the lemons, the mean weight is 118 g and the standard deviation is 12 g.

(i) Find the mean weight of the 45 fruits. [2]

(ii) The individual weights of the oranges in grams are denoted by x_o, and the individual weights of the lemons in grams are denoted by x_l. By first finding Σx_o^2 and Σx_l^2, find the variance of the weights of the 45 fruits. [5]

5 **(a)** The random variable X is normally distributed with mean 82 and standard deviation 7.4. Find the value of q such that $P(82 - q < X < 82 + q) = 0.44$. [3]

(b) The random variable Y is normally distributed with mean μ and standard deviation σ. It is given that $5\mu = 2\sigma^2$ and that $P(Y < \frac{1}{2}\mu) = 0.281$. Find the values of μ and σ. [4]

6 **(i)** Find the number of different ways that the 9 letters of the word AGGREGATE can be arranged in a line if the first letter is R. [2]

(ii) Find the number of different ways that the 9 letters of the word AGGREGATE can be arranged in a line if the 3 letters G are together, both letters A are together and both letters E are together. [2]

(iii) The letters G, R and T are consonants and the letters A and E are vowels. Find the number of different ways that the 9 letters of the word AGGREGATE can be arranged in a line if consonants and vowels occur alternately. [3]

(iv) Find the number of different selections of 4 letters of the word AGGREGATE which contain exactly 2 Gs or exactly 3 Gs. [3]

7 Dayo chooses two digits at random, without replacement, from the 9-digit number 113 333 555.

(i) Find the probability that the two digits chosen are equal. [3]

(ii) Find the probability that one digit is a 5 and one digit is not a 5. [3]

(iii) Find the probability that the first digit Dayo chose was a 5, given that the second digit he chose is not a 5. [4]

(iv) The random variable X is the number of 5s that Dayo chooses. Draw up a table to show the probability distribution of X. [3]

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