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 2010**

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 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.

This document consists of **3** printed pages and **1** blank page.

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1 The times in minutes for seven students to become proficient at a new computer game were measured. The results are shown below.

15 10 48 10 19 14 16

(i) Find the mean and standard deviation of these times. [2]

(ii) State which of the mean, median or mode you consider would be most appropriate to use as a measure of central tendency to represent the data in this case. [1]

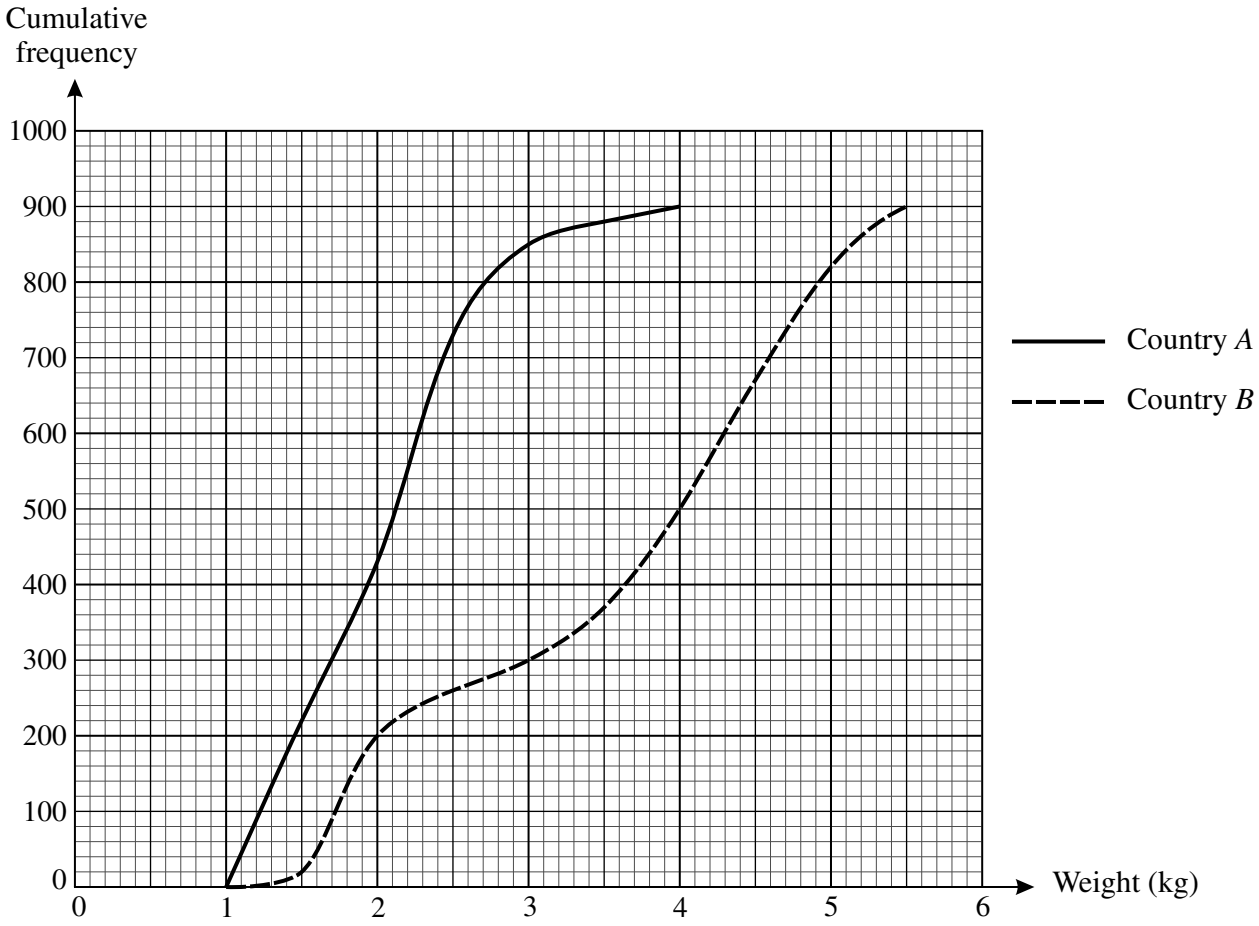
(iii) For each of the two measures of average you did not choose in part **(ii)**, give a reason why you consider it inappropriate. [2]

2 The lengths of new pencils are normally distributed with mean 11 cm and standard deviation 0.095 cm.

(i) Find the probability that a pencil chosen at random has a length greater than 10.9 cm. [2]

(ii) Find the probability that, in a random sample of 6 pencils, at least two have lengths less than 10.9 cm. [3]

3



The birth weights of random samples of 900 babies born in country *A* and 900 babies born in country *B* are illustrated in the cumulative frequency graphs. Use suitable data from these graphs to compare the central tendency and spread of the birth weights of the two sets of babies. [6]

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4 The random variable X is normally distributed with mean μ and standard deviation σ.

(i) Given that $5\sigma = 3\mu$, find $\mathrm{P}(X < 2\mu)$. [3]

(ii) With a different relationship between μ and σ, it is given that $\mathrm{P}(X < \frac{1}{3}\mu) = 0.8524$. Express μ in terms of σ. [3]

5 Two fair twelve-sided dice with sides marked 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 are thrown, and the numbers on the sides which land face down are noted. Events Q and R are defined as follows.

Q : the product of the two numbers is 24.

R : both of the numbers are greater than 8.

(i) Find $\mathrm{P}(Q)$. [2]

(ii) Find $\mathrm{P}(R)$. [2]

(iii) Are events Q and R exclusive? Justify your answer. [2]

(iv) Are events Q and R independent? Justify your answer. [2]

6 A small farm has 5 ducks and 2 geese. Four of these birds are to be chosen at random. The random variable X represents the number of geese chosen.

(i) Draw up the probability distribution of X. [3]

(ii) Show that $\mathrm{E}(X) = \frac{8}{7}$ and calculate $\mathrm{Var}(X)$. [3]

(iii) When the farmer's dog is let loose, it chases either the ducks with probability $\frac{3}{5}$ or the geese with probability $\frac{2}{5}$. If the dog chases the ducks there is a probability of $\frac{1}{10}$ that they will attack the dog. If the dog chases the geese there is a probability of $\frac{3}{4}$ that they will attack the dog. Given that the dog is not attacked, find the probability that it was chasing the geese. [4]

7 Nine cards, each of a different colour, are to be arranged in a line.

(i) How many different arrangements of the 9 cards are possible? [1]

The 9 cards include a pink card and a green card.

(ii) How many different arrangements do not have the pink card next to the green card? [3]

Consider all possible choices of 3 cards from the 9 cards with the 3 cards being arranged in a line.

(iii) How many different arrangements in total of 3 cards are possible? [2]

(iv) How many of the arrangements of 3 cards in part **(iii)** contain the pink card? [2]

(v) How many of the arrangements of 3 cards in part **(iii)** do not have the pink card next to the green card? [2]

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