TAYLOR'S
COLLEGE

Wisdom • Integrity • Excellence
since 1969

CAMBRIDGE A LEVEL PROGRAMME

AS TRIAL EXAMINATION AUGUST/SEPTEMBER 2010

(January and March 2010 Intakes)

Wednesday **25 August 2010** **12.30 pm – 1.45 pm**

MATHEMATICS 9709/63

PAPER 6 Probability & Statistics 1 (S1) 1 hour 15 minutes

Additional materials: Answer Booklet/Paper
Graph Paper
List of formulae (MF9)

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your name and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
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.
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 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.
The use of an electronic calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.

This document consists of 4 printed pages.

[Turn over

1 The letters of the word CHOCOLATE are written on 9 cards, one on each card. The cards are shuffled and then arranged in a straight line.

(i) How many different possible arrangements are there? [1]

(ii) What is the probability that the letters H and T are together? [2]

2 A manufacturer of chocolates produces three times as many soft chocolates as hard centered ones. Assuming that the chocolates are randomly distributed within boxes of chocolates,

(i) Find the probability that in a box containing 10 chocolates there are fewer than 2 hard centered chocolates. [2]

(ii) By using a suitable approximation, find the probability that more than 80 out of 100 randomly chosen chocolates are soft centered. [4]

3 The length of time for which an ordinary light bulb will last may be taken to have a normal distribution with mean 600 hours and standard deviation 100 hours. The length of time for which a new 'long life' bulb will last may be taken to have a normal distribution with mean 2000 hours and standard deviation 200 hours.

(i) One ordinary bulb is chosen at random. Find the probability that it will last for more than 450 hours. [3]

(ii) What is the probability that the ordinary light bulb will last for more than 450 hours and the long life bulb will last for at most 2010 hours? [4]

4 At a stall in a charity fair, a card is selected at random from a set of 13 different cards and placed face down. The player has up to 3 guesses to say which card it is. Let X be the number of guesses made. (For example, the player guesses incorrectly at the first attempt and correctly at the second attempt, then X=2)

(i) Show that $P(X=3) = \frac{11}{13}$. Write down the values of $P(X=1)$ and $P(X=2)$. [4]

(ii) Find $E(X)$ and $Var(X)$. [3]

5 The marks of candidates, in an international Mathematics examination, from three countries C, D and E are summarised in the following table.

	Country C	Country D	Country E
Highest mark obtained	120	116	94
Lowest mark obtained	11	23	26
Median	46	55	60
Upper quartile	81	88	74
Lower quartile	32	45	46

(i) On a graph paper, using a scale of 1 cm to 10 marks, draw box and whisker plots to represent the marks from these countries on a single diagram. [4]

(ii) Hence, comment on the distribution of marks for Country C and Country E. [2]

(iii) State one advantage and one disadvantage of a box and whisker plot. [2]

6 The table below shows the age (at last birthday) at which women married in 1986 in England and Wales.

Age (in years)	Women (in tens of thousands)
16-20	6
21-24	12
25-29	8
30-34	3
35-44	3
45-54	1
55-99	1

(i) Draw a cumulative frequency graph to illustrate these data. [3]

(ii) Estimate from your graph

(a) the number of women who were aged between 40 or over when they got married. [1]

(b) the median age of marriage for women. [1]

(iii) Calculate, showing your working clearly, the estimates for the mean and standard deviation of the distribution. [4]

7 The staffs employed by a college are classified as academic, administrative or support. The following table shows the number of employed in these categories and their gender.

	Male	Female
Academic	42	28
Administrative	7	13
Support	26	9

A member of staff is selected at random.

Let A, B and C represents the event that the person selected is female, academic and administrative staff respectively.

Evaluate the following.

(i) P(A) [1]

(ii) $P(A \cap B)$ [1]

(iii) $P(A \cup C')$ [2]

(iv) $P(A'/C)$ [2]

(v) Are the events A and B independent? [3]

(vi) Write down one of the events, which is mutually exclusive of B? [1]