TAYLOR'S UNIVERSITY COLLEGE
Wisdom · Integrity · Excellence

CAMBRIDGE A LEVEL PROGRAMME

AS TRIAL EXAMINATION MARCH/APRIL 2009

(June 2008 Intake)

Wednesday 1 April 2009 1.30 pm – 2.45 pm

MATHEMATICS 9709/6

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, and 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 3 printed pages.

[Turn over

1 Salt is packed in bags which the manufacturer claims contain 25 kg each. Eighty bags are examined and the mass, x kg, of each is found. The results are $\sum(x-25)=27.2$, $\sum(x-25)^2=85.1$. Find the mean and the standard deviation of the masses. [4]

2 Find the number of 4-letter code words that can be made from the letters of the word ADVANCE,

(i) using neither of the "A"s, [2]

(ii) using both of the "A"s. [2]

3 The thickness, to the nearest 0.1 cm, of the books arranged on a book shelf selected randomly in a library is shown in the following table.

Thickness of book	Number of books
$2.0 \le t < 3.5$	16
$3.5 \le t < 4.0$	12
$4.0 \le t < 4.5$	18
$4.5 \le t < 5.0$	24
$5.0 \le t < 5.5$	20
$5.5 \le t < 6.5$	10

Plot the cumulative frequency graph for the data above, and estimate the median and inter-quartile range for the thickness of the books on the shelf. [6]

4 Every day, a fisherman can choose to fish at sea, by the river or at a lake. The probabilities that he fishes at sea, by the river, and at the lake are $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{4}$ respectively. If he goes out to sea to fish, his chances of catching some fish is 80% while his chances of catching some fish at the river and the lake are 40% and 60% respectively.

(i) Find the probability that the fisherman catches fish on a randomly chosen day. [2]

(ii) If one day, the fisherman does not catch any fish, determine the place he most probably has chosen to fish. [5]

5 In a flower pot kiln, 20% of the flower pots produced have cracks. For a random sample of five flowerpots, find the probability that

(i) exactly one flower pot is cracked, [2]

(ii) at least one flower pot is cracked. [2]

If a random sample of 100 flower pots is taken, by using a suitable approximation, determine the probability that at least a quarter of that sample are cracked. [4]

6 A random variable X is normally distributed with mean 10 and standard deviation 2. Find

(i) $P(X > 12)$ and $P(9 < X < 13)$, [3]

(ii) the possible values of a if the probability that X lies between a and 12 is 0.15. [5]

If three values of X are chosen at random, calculate the probability that two of the values are less than 12 and the other is more than 12. [2]

7 A fair die is rolled once. If the score is three or more, then the 'outcome' X is the score on the die. If the scores are one and two, then the die has to be rolled once again and the 'outcome' X is the sum of scores of the two rolls.

(i) Show that $P(X=6) = \frac{2}{9}$ and $P(X=7) = \frac{1}{18}$. [4]

(ii) Copy and complete the following table to show the probability distribution of X. [5]

X	2	3	4	5	6	7	8
$P(X=x)$					$\frac{2}{9}$	$\frac{1}{18}$	

(iii) Show that $E(X) = \frac{14}{3}$. [2]