TAYLOR'S UNIVERSITY COLLEGE

Wisdom · Integrity · Excellence

CAMBRIDGE A LEVEL PROGRAMME
SEMESTER ONE EXAMINATION JUNE 2009
(January 2009 Intake)

Thursday   11 June 2009   10.30 am – 11.45 am

MATHEMATICS   9709/6

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

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

READ THESE INSTRUCTIONS FIRST

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 3 printed pages.

[Turn over

1 Events A and B are such that P(A) = 0.8, P(B) = 0.3 and P(A and B) = 0.4. State, giving a reason in each case, whether events A and B are

(i) independent, [2]

(ii) mutually exclusive. [2]

2 A certain tribe is distinguished by the fact that 45% of the males have six toes on their right foot. Determine using a suitable approximation, the probability that, in a group of 200 males from the tribe, more than 97 have six toes on their right foot. [5]

3 Three balls are to be placed in three boxes, not necessarily with one ball in each box. Any box can hold one, two or three balls. Find the number of ways the balls can be placed, if they are all of

(i) the same colour and therefore indistinguishable. [3]

(ii) different colours. [3]

4 In a company, the number of hours the part-time workers work in a week is normally distributed with mean 20 and standard deviation 6.9.

(i) Calculate the proportion of workers who work more than 25 hours. [3]

(ii) Given that only 3% of the workers worked for less than 7 hours, calculate T. [3]

5 A die is biased so that, when it is rolled, the probability of obtaining a score of 6 is $\frac{1}{4}$. The probabilities of obtaining each of the other five scores 1, 2, 3, 4, and 5 are all equal. Calculate the probability of obtaining a score of five with this biased die. [2]

(i) The biased die and an unbiased die are now rolled together. Calculate the probability that the total score is 11 or more. [3]

(iii) The two dice are rolled again. Given that the total score is 11 and more, calculate the probability that the score on the biased die is 6. [8]

6 The six faces of a fair cubical die are numbered 1, 2, 2, 3, 3, 3. When the die is thrown once, the score, X is the number appearing on the top face.

(i) Find the mean and standard deviation of X. [3]

The die is thrown twice and Y denotes the sum of the scores obtained.
Draw up a table to show the probability distribution of Y. [3]

(ii) Find the expectation and variance of Y. [4]

7 A school entered 88 students for an examination. The results of the examination are shown in the table below.

Mark (x)	Frequency
$0 < x \leq 10$	3
$10 < x \leq 20$	6
$20 < x \leq 30$	9
$30 < x \leq 40$	10
$40 < x \leq 50$	12
$50 < x \leq 60$	18
$60 < x \leq 70$	14
$70 < x \leq 80$	11
$80 < x \leq 90$	5

(i) Calculate, showing your working and giving your answers correct to two decimal places, the mean mark and the variance. [4]

(ii) Draw, on graph paper, a cumulative frequency polygon to illustrate the distribution of the examination marks. [3]

(iii) Use your graph to estimate
(a) the median mark, [1]
(b) the interquartile range. [2]

The lowest mark required to obtain a grade A in the examination was 75.

(iv) Estimate from your graph the number of students who were awarded a grade A for this examination. [1]