

TAYLOR'S
COLLEGE



Wisdom • Integrity • Excellence

**CAMBRIDGE A LEVEL PROGRAMME
AS TRIAL EXAMINATION MARCH/APRIL 2010**

(June 2009 Intake)

Tuesday

6 April 2010

1.30 pm – 2.45 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

- 1 Find the number of arrangements of all nine letters of the word SELECTION in which the two letters E
- (i) are next to each other. [1]
 - (ii) are not next to each other. [2]
- 2 For each of 50 plants, the height, h cm, was measured and the value of $(h-100)$ was recorded. The mean and standard deviation of $(h-100)$ were found to be 24.5 and 4.8 respectively.
- (i) Write down the mean and standard deviation of h . [2]
- The mean and standard deviation of the heights of another 100 plants were found to be 123.0 cm and 5.1 cm respectively.
- (ii) Calculate the mean height of all 150 plants. [2]
- 3 A factory has 36 male workers and 64 female workers, with 10 male workers earning less than RM1000 a month and 17 female workers earning at least RM1000 a month. At the end of the year, workers earning less than RM 1000 are given a bonus of RM 1000 whereas the others receive a bonus of one month's salary.
- (i) If two workers are randomly chosen, find the probability that exactly one worker receives a bonus of one month's salary. [3]
 - (ii) If a male worker and a female worker are randomly chosen, find the probability that exactly one worker receives a bonus of one month's salary. [3]

- 4 In 1994 an insurance company received claims from 20 % of the motorists it had insured.
- (a) For a random sample of 14 motorists insured with the company in 1994, find the probability that
- (i) exactly three claimed on their insurance, [2]
 - (ii) between two and five inclusive claimed on their insurance. [2]
- (b) For a random sample of 90 motorists insured with the company, use a suitable approximation, find the probability that at least 25 claimed on their insurance in 1994. [4]
- 5 The table below shows the length of telephone calls from my house during the first six months of last year.

Length of telephone calls in minutes, x	Frequency
$0 < x \leq 5$	40
$5 < x \leq 10$	56
$10 < x \leq 15$	28
$15 < x \leq 20$	20
$20 < x \leq 25$	12
$25 < x \leq 30$	4

- (i) Draw, on graph paper, a cumulative frequency curve. [3]
- (ii) From the curve, estimate the median and inter-quartile range. [3]
- (iii) Estimate how many telephone calls took longer than 16 minutes. [1]
- (iv) Use the table given to estimate the mean length of call. [2]

[Turn over

- 6 The discrete random variable X has the probability function

$$P(X = x) = \begin{cases} ax, & x = 1, 2, 3, 4, 5 \\ a(11 - x), & x = 6, 7, 8, 9, 10 \end{cases}$$

- (i) Determine the value of constant a . [2]
- (ii) Find $E(X)$ and $\text{Var}(X)$. [5]
- (iii) Find the probability that X is an even number. [2]

- 7 (a) The masses of textbooks in a school bag of a student follow a normal distribution with mean μ and standard deviation σ . 10% of the textbooks have masses exceeding 900g and 5% have masses less than 750g. Find the values μ and σ . [6]

- (b) Tea bags are labeled as containing 2g of tea powder. In actual fact, the mass of tea powder per bag has mean 2.05g and standard deviation 0.05g. Assuming that the mass of tea powder of each bag is normally distributed, calculate the expected number of tea bags which contain 1.95g to 2.10g of tea powder in a box of 100 tea bags. [5]