TAYLOR'S
UNIVERSITY
COLLEGE
Wisdom Integrity Excellence

CAMBRIDGE A LEVEL PROGRAMME

AS TRIAL EXAMINATION AUGUST/SEPTEMBER 2009
(January & March 2009 Intake)

Thursday   3 September 2009   1.30 pm – 2.45 pm

MATHEMATICS   9709/62

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 A summary of 20 observations of x gave the following information:

$$\sum(x-b) = -73.2 \text{ and } \sum(x-b)^2 = 1950$$

The mean of these values of x is 4.34.

(i) Find the value of the constant b. [2]

(ii) Find the standard deviation of these values of x. [2]

2 A company has 38 used computers for sale. The table below shows the age, x (in years) of the computers.

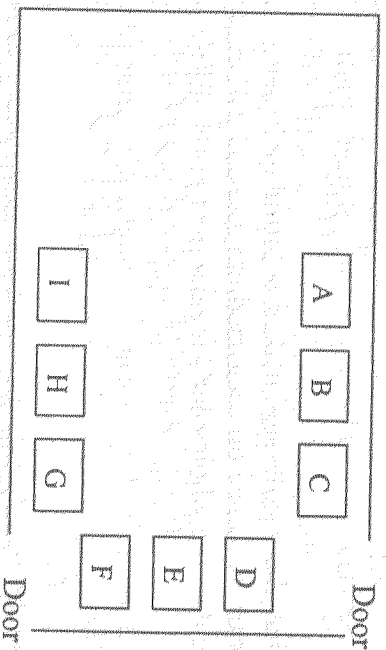| Age(x)	1	2	3	4	5	6	7
Frequency	7	10	8	6	4	2	1

(i) Find

  (a) the mode age [1]

  (b) the median age [1]

  (c) the first and third quartiles for this distributions [2]

(ii) Draw a box plot to represent the data. [2]

3 Eden can travel to work either by bus or car. The probability that she is late for work when she goes by bus is 0.15, and the probability that she is early when she uses the car is 0.9. Eden uses the car for 70% of her journeys to work.

(i) Draw a tree diagram to illustrate the situation above. [1]

(ii) Find the probability that Eden will be late for work on a randomly chosen day. [2]

(iii) Find the conditional probability that Eden travels by bus, given that she is late for work. [3]

A room has two doors at the corners. There are nine fixed chairs labelled A, B, C, ...,H and I in the room, lined up against the walls as shown in the diagram above. Nine girls are to be seated in the room, one on each chair. In how many ways can this be done? [1]

Find the number of ways in which they can be seated

(i) if two particular girls cannot be seated on any of the four chairs next to a door. [3]

(ii) if two particular girls cannot be seated next to each other against the same wall. [3]

5 A large bag of seeds contains three varieties in the ratio 4: 2: 1 and their germination rates are 50%, 60% and 80% respectively.

(i) What is the probability that a seed chosen at random from the bag will germinate? [2]

(ii) Find, to three decimal places, the probability that of four seeds chosen at random from the bag, exactly two of them will germinate. [2]

(iii) 150 seeds are chosen at random from the bag. Use a suitable approximation to estimate the probability that fewer than 90 of them will germinate. [4]

6   A wholesaler buys cauliflowers from a farmer for distribution to retail greengrocers. The wholesaler classifies the lightest 15% of the cauliflowers as small, the heaviest 25% as large, and the rest as medium.

(i)   Given that the wholesaler makes a profit of 2 pence on each small cauliflower, 12 pence on each medium one and 27 pence on each large one, calculate the wholesaler's mean profit per cauliflower.   [2]

The weights of the cauliflowers can be modeled by normal distribution with a mean of 628g and a standard deviation of 160g.

(ii) Calculate the weight that a cauliflower must exceed to be classified as large.   [3]

(iii) Calculate the weight that a cauliflower must fall below to be classified as small.   [4]

7   In a game, Justin tosses 3 fair coins. He will receive $8 if all the three coins show 'heads', $x if two 'heads' are obtained, $3 if one "head" is obtained and $1 if no "head" appear.

(i)   Construct a probability distribution table for the number of heads obtained.   [2]

(ii) State, in terms of x, the expected gain for Justin in each game.   [3]

If Justin pays $3.75 to participate in each game, find

(iii) the value of x so that each game is fair,   [3]

(iii) the expected gain or loss for Justin after he plays 100 games when x = 3.5.   [2]