TAYLOR'S
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COLLEGE

Wisdom · Integrity · Excellence

CAMBRIDGE A LEVEL PROGRAMME

AS TRIAL EXAMINATION AUGUST/SEPTEMBER 2008

(January 2008 & March 2008 Intake)

Wednesday   27 August 2008   2.30 pm – 3.45 pm

MATHEMATICS

PAPER 6   Probability & Statistics 1 (S1)   9709/6

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 SURPRISES are rearranged.
How many different arrangements are there

(i) if there are no restrictions imposed? [2]

(ii) if the two R's are not next to each other? [2]

2. The following table shows the size (in hectares) and the frequency (to the nearest 100) of vineyards in a certain Department of France:

Size (hectares)	Frequency
0 – 10	5500
10 – 20	4100
20 – 40	3900
40 – 80	3200
80 – 160	2400
160 – 1280	700

(i) State which of the mean, median or mode is the most appropriate measure of position to use with the above data. [1]

(ii) Give reasons for your choices that are not appropriate. [2]

(iii) Estimate the measure you select. [3]

3. (i) It is estimated that one quarter of the drivers on the road between 11 p.m. and midnight have been drinking during the evening. If a driver has not been drinking, the probability that he will have an accident at that time of night is 0.004%; if he has been drinking, the probability of an accident goes up to 0.2%. What is the probability that a car selected at random at that time of night will be involved in an accident? [3]

(ii) A policeman on the beat duty at 11:30 p.m. sees a car run into a lamp post and jumps to the conclusion that the driver has been drinking. What is the probability that he is right? [3]

4. In a phone-in competition run by a local radio station, listeners are given the names of 5 local personalities and are told that 2 of them are in the studio. Competitors phone in and guess which 2 are in the studio and each competitor is only allowed to make two guesses.

(i) Show that the probability that a randomly selected competitor guesses all 2 correctly is $\dfrac{1}{10}$. [2]

(ii) Let X represent the number of correct guesses made by a randomly selected competitor. Construct a probability distribution table for X. [2]

(iii) Find the expected value and variance of X. [3]

5. A sugar manufacturing company packs sugar in packets with a mean weight of 1 kg. The weights are normally distributed with a standard deviation of 5 g.

(i) What percentage of packets weighs less than 995 g. [3]

(ii) If the mean weight remains at 1 kg, what must the standard deviation be so that only 5% of the packets weigh less than 995 g? [3]

(iii) Suppose the company has succeeded in its aim to have only 5% of the packets weighing less than 995 g. Five packets of sugar are chosen at random, what is the probability that all the packets weigh more than 995 g. [2]

6. A factory makes 3 different types of chocolates:

   25% are plain chocolates
   35% are dark chocolates
   40% are white chocolates

(i) Twenty chocolates are chosen at random. Find the probability that these chocolates include

(a) exactly 8 white chocolates. [2]

(b) more than one dark chocolate, [3]

(ii) A sample of 150 chocolates is chosen in the factory, use a suitable approximation to estimate the probability that this sample includes more than 45 plain chocolates. [4]

7. The times (in seconds) taken for a group of experienced rats to run through a maze are to be compared with the times for a group of inexperienced rats. The data are:

Experienced rats:

121, 137, 130, 128, 132, 127, 129, 131, 135, 130, 126, 120, 118, 125.

Inexperienced rats:

135, 142, 145, 156, 149, 134, 139, 126, 147, 152, 153, 145, 144.

(i) Find the median and the upper and lower quartiles for each group of rats. [4]

(ii) Plot the two sets of data on a single graph using boxplots. [4]

(iii) Give two comments on the results. [2]