CAMBRIDGE A LEVEL PROGRAMME

SEMESTER ONE EXAMINATION NOV/DEC 2009

(June 2009 intake)

Friday	4 December 2009	8.30 am – 9.45 am

MATHEMATICS

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

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

9709/6

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.

1. Rice is packed in bags which the manufacturer claims contain 20kg each. Fifty bags are examined and the mass, x kg, of each is found. Given that $\sum(x-20) = 25.5$ and $\sum(x-20)^2 = 80.5$. Find the mean and the standard deviation of the masses. [4]

2. The probability that an event A occurs is $P(A) = 0.4$. B is an event independent of A and the probability of the union of A and B is $P(A \cup B) = 0.7$.

    (i)   Find $P(B)$. [2]

    (ii) State with a reason, are events A and B mutually exclusive? [2]

3. The table below shows the number of audiences according to age, in years, that watch a horror film for a session at a mini theater.

Age, x	Number of audiences
$15 \le x < 18$	15
$18 \le x < 21$	30
$21 \le x < 27$	33
$27 \le x < 33$	12
$33 \le x < 39$	6
$39 \le x < 45$	4

    (i)   Plot a cumulative frequency curve for the above data. [3]

    (ii) From the curve, estimate the median and the interquartile range. [3]

4 An unbiased disc has a single dot marked on one side and two dots marked on the other side. The disc and an unbiased die are thrown and the variable X is the sum of the numbers of dots showing on the disc and on the top of the die.

(i) Tabulate the probability distribution of X. [3]

(ii) Find $E(X)$ and $Var(X)$. [4]

5 The time taken by the customers of a company to settle invoices is normally distributed with mean 20 days and standard deviation 5 days. A discount is given for every invoice which is settled in less than 12 days.

(i) Find the probability that an invoice is settled in 18 to 26 days. [3]

(ii) Find the probability that exactly 2 out of 10 invoices are given discounts. [4]

6 In a production process of flower vases, is known that an average 45 flower vases have cracks in every 1000 flower vases produced.

(i) Find the probability that there are at most two flower vases having cracks in a random sample of size 5. [3]

(ii) If the probability that no flower vases, in n flower vases selected at random, having cracks is 0.1, determine the value of n. [3]

(iii) By using suitable approximation, find the probability that more than three flower vases have cracks in a random sample of size 100. [4]

7   At Fun-O-Rama, a class decides on a game which requires a player to pick some coloured cards which are indistinguishable except for their colour. There are 6 red, 4 blue and 2 yellow cards.

(a)   Find the number of ways in which.

(i)   any 3 cards are selected without replacement;   [3]

(ii)   only 11 cards are arranged in a line.   [3]

(b)   The class decides that the game is played by picking 4 cards without replacement and the total points are added from the 4 cards with each coloured card assigned a different score as follows:

      Red: 1 point   Yellow: 3 points   Blue: no point

Find the probability that a player

(i)   obtains 4 points;   [3]

(ii)   has exactly 2 blue cards given that the total score is 4.   [3]