MATHEMATICS   **9709/6**

STATISTICS   **0390/6**

PAPER 6   Probability & Statistics 1 **(S1)**

OCTOBER/NOVEMBER SESSION 2002

1 hour 15 minutes

Additional materials:
    Answer paper
    Graph paper
    List of Formulae (MF9)

TIME   1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

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.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of 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 question paper consists of 3 printed pages and 1 blank page.

© CIE 2002   **[Turn over**

1 The discrete random variable X has the following probability distribution.

x	1	3	5	7
P($X = x$)	0.3	a	b	0.25

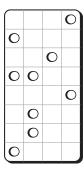   **(i)** Write down an equation satisfied by a and b. [1]

    (ii) Given that E(X) = 4, find a and b. [3]

2 Ivan throws three fair dice.

    (i) List all the possible scores on the three dice which give a total score of 5, and hence show that the probability of Ivan obtaining a total score of 5 is $\frac{1}{36}$. [3]

    (ii) Find the probability of Ivan obtaining a total score of 7. [3]

3 The distance in metres that a ball can be thrown by pupils at a particular school follows a normal distribution with mean 35.0 m and standard deviation 11.6 m.

    (i) Find the probability that a randomly chosen pupil can throw a ball between 30 and 40 m. [3]

    (ii) The school gives a certificate to the 10% of pupils who throw further than a certain distance. Find the least distance that must be thrown to qualify for a certificate. [3]

4 In a certain hotel, the lock on the door to each room can be opened by inserting a key card. The key card can be inserted only one way round. The card has a pattern of holes punched in it. The card has 4 columns, and each column can have either 1 hole, 2 holes, 3 holes or 4 holes punched in it. Each column has 8 different positions for the holes. The diagram illustrates one particular key card with 3 holes punched in the first column, 3 in the second, 1 in the third and 2 in the fourth.

    (i) Show that the number of different ways in which a column could have exactly 2 holes is 28. [1]

    (ii) Find how many different patterns of holes can be punched in a column. [4]

    (iii) How many different possible key cards are there? [2]

5 Rachel and Anna play each other at badminton. Each game results in either a win for Rachel or a win for Anna. The probability of Rachel winning the first game is 0.6. If Rachel wins a particular game, the probability of her winning the next game is 0.7, but if she loses, the probability of her winning the next game is 0.4. By using a tree diagram, or otherwise,

    (i) find the conditional probability that Rachel wins the first game, given that she loses the second, [5]

    (ii) find the probability that Rachel wins 2 games and loses 1 game out of the first three games they play. [4]

6   **(i)** A manufacturer of biscuits produces 3 times as many cream ones as chocolate ones. Biscuits are chosen randomly and packed into boxes of 10. Find the probability that a box contains equal numbers of cream biscuits and chocolate biscuits. [2]

    (ii) A random sample of 8 boxes is taken. Find the probability that exactly 1 of them contains equal numbers of cream biscuits and chocolate biscuits. [2]

    (iii) A large box of randomly chosen biscuits contains 120 biscuits. Using a suitable approximation, find the probability that it contains fewer than 35 chocolate biscuits. [5]

7 The weights in kilograms of two groups of 17-year-old males from country P and country Q are displayed in the following back-to-back stem-and-leaf diagram. In the third row of the diagram, $\ldots 4\,|\,7\,|\,1 \ldots$ denotes weights of 74 kg for a male in country P and 71 kg for a male in country Q.

Country P		Country Q
	5	1 5
	6	2 3 4 8
9 8 7 6 4	7	1 3 4 5 6 7 7 8 8 9
8 8 6 6 5 3	8	2 3 6 7 7 8 8
9 7 7 6 5 5 5 4 2	9	0 2 2 4
5 4 4 3 1	10	4 5

    (i) Find the median and quartile weights for country Q. [3]

    (ii) You are given that the lower quartile, median and upper quartile for country P are 84, 94 and 98 kg respectively. On a single diagram on graph paper, draw two box-and-whisker plots of the data. [4]

    (iii) Make two comments on the weights of the two groups. [2]

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