



**CAMBRIDGE A LEVEL PROGRAMME**  
**AS TRIAL EXAMINATION MARCH/APRIL 2011**  
(June 2010 Intake)

**Tuesday**

**29 March 2011**

**2.30 pm – 3.45 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 The mean and median of a set of seven numbers 9, 10, 11, 14, 15,  $m$  and  $n$  are both 10. There is no mode, and  $m$  and  $n$  are positive integers where  $m > n$ . Find the possible values of  $m$  and  $n$ . [4]

- 2 A tennis competition continues until either Jonathan or Thomas wins three games. Considering the possible orderings for the winning players, in how many ways could this tennis match end? [5]

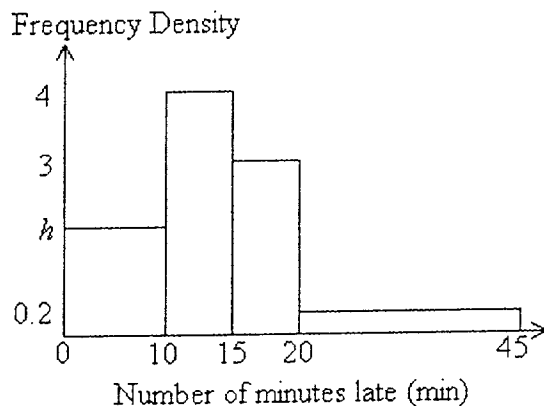
- 3 It is known that, on average, one match box in 10 contains fewer than 42 matches. Eight boxes are selected, and the number of boxes that contains fewer than 42 matches is denoted by  $Y$ .  
(i) State two conditions needed to model  $Y$  by a binomial distribution. [2]

Assume now that a binomial model is valid.

- (ii) Find  $P(Y \geq 2)$ . [2]

- (iii) On Wednesday 8 boxes are selected, and on Thursday another 8 boxes are selected. Find the probability that on one of these days the number of boxes containing fewer than 42 matches is 0, and that on the other day the number is 2 or more. [2]

4



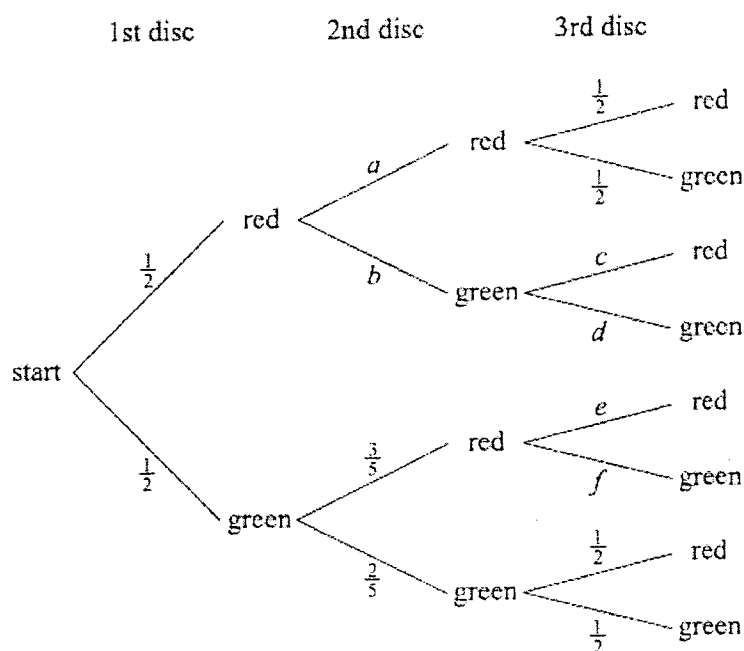
The punctuality of several trains at a particular station is displayed in the histogram. The number of trains getting late for 0 – 10 minutes and 10 – 15 minutes are same.

- (i) Find the value of  $h$ . [1]  
(ii) Determine the total number of trains studied. [2]  
(iii) Calculate the mean and standard deviation. [4]

- 5 The random variable  $H$  has the distribution  $B(n, p)$ . It is given that, using a normal approximation,  $P(H \geq 71) = 0.0401$  and  $P(H \leq 46) = 0.0122$ .
- (i) Find the mean and standard deviation of the approximating normal distribution. [5]
- (ii) Hence find the values of  $n$  and  $p$ . [3]
- 6 A dice is rolled 3 times. The events  $A$ ,  $B$  and  $C$  are defined as follow:
- $A$ : The sum of the scores is an odd number.
- $B$ : The sum of the scores is 13.
- $C$ : The number 6 appears on the third roll.
- (i) Find  $P(A)$  and  $P(A|C)$ , and state if  $A$  and  $C$  are independent. [5]
- (ii) Find  $P(B)$  and  $P(B|C)$ , and state if  $B$  and  $C$  are independent. [5]

- 7 Two bags contain coloured discs. At first, bag  $P$  contains 2 red discs and 2 green discs, and bag  $Q$  contains 3 red discs and 1 green disc. A disc is chosen at random from bag  $P$ , its colour is noted and it is placed in bag  $Q$ . A disc is then chosen at random from bag  $Q$ , its colour is noted and it is placed in bag  $P$ . A disc is then chosen at random from bag  $P$ .

The tree diagram shows the different combinations of three coloured discs chosen.



- (i) Write down the values of  $a$ ,  $b$ ,  $c$ ,  $d$ ,  $e$  and  $f$ . [3]

The total number of red discs chosen, out of 3, is denoted by  $R$ . The table shows the probability distribution of  $R$ .

$r$	0	1	2	3
$P(R = r)$	$\frac{1}{10}$	$k$	$\frac{9}{20}$	$\frac{1}{5}$

- (ii) Show how to obtain the value  $P(R = 2) = \frac{9}{20}$ . [2]  
 (iii) Find the value of  $k$ . [1]  
 (iv) Calculate the mean and variance of  $R$ . [4]