



**CAMBRIDGE A LEVEL PROGRAMME**  
**SEMESTER ONE EXAMINATION JUNE 2010**  
(January 2010 Intake)

Thursday

10 June 2010

10.00 am – 11.15 am

**MATHEMATICS**

**9709/6**

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

**1 hour 15 minutes**

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

**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.

This document consists of 3 printed pages.

- 1 The table below shows the probability distribution for a random variable  $X$ .

$x$	0	1	2	3
$P(X = x)$	0.1	$k$	0.4	0.2

- (i) State the value of  $k$ . [1]  
 (ii) Calculate  $E(X)$  and  $\text{Var}(X)$  [3]

- 2 For each of 50 plants, the height,  $h$  cm was measured and the value of  $(h-100)$  was recorded. The mean and standard deviation of  $(h-100)$  were found to be 20.2 cm and 3.8 cm respectively.

- (i) Write down the mean and standard deviation of  $h$ . [2]

The mean of the heights of another 100 plants were found to be 112 cm.

- (ii) Calculate the mean height of all 150 plants. [2]

- 3 The digits 1, 2, 3, 4 and 5 are arranged in random order, to form a five-digit number.

- (i) How many different five-digit numbers can be formed? [1]

- (ii) How many different five-digit numbers are

- (a) odd [2]

- (b) less than 23000? [3]

- 4 A stationery shop sells ball-point pens in boxes of ten. The probability that a pen is defective is 0.1.

- (i) A box of pens is randomly chosen. Calculate the probability that the box chosen contains at most 1 defective pen. Give your answers to three decimal places. [3]

- (ii) 100 boxes of the pens are taken randomly. Use a suitable approximation to find the probability that less than 71 boxes contain at most 1 defective pen. [4]

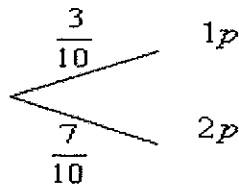
- 5 The marks of 500 candidates in a certain mathematics examination are normally distributed with mean 45 and standard deviation 20.

- (i) If the minimum mark to pass the examination is 41, estimate the number of candidates who pass the examination. [3]

- (ii) If 5% of the candidates pass with excellent result by obtaining the minimum marks  $\alpha$ , estimate the value of  $\alpha$ . [4]

- 6 A bag contains three 1p coins and seven 2p coins. Coins are taken at random one at a time, without replacement, until the total value of the coins taken is at least 3p. Then no more coins are taken.

(i) Copy and complete the probability tree diagram



[4]

Find the probability that

- (ii) exactly two coins are taken. [3]  
 (iii) the total value of the coins taken is 3p, given exactly two coins are taken. [3]

- 7 The following data shows the marks obtained by 25 students in a Mathematics test.

47	53	62	79	36
66	34	85	46	35
82	87	42	59	65
75	40	31	64	44
41	67	54	88	68

- (i) Construct a stem plot. [3]  
 (ii) Find the mean and the standard deviation. [3]  
 (iii) Find the first quartile, median and third quartile of the above data. [3]  
 (iv) Construct a box plot of the data. [3]