



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education  
Advanced Subsidiary Level and Advanced Level

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**MATHEMATICS**

**9709/62**

Paper 6 Probability & Statistics 1 (S1)

**October/November 2009**

**1 hour 15 minutes**

Additional Materials: Answer Booklet/Paper  
Graph Paper  
List of Formulae (MF9)

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**READ THESE INSTRUCTIONS FIRST**

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

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.

The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

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 number of marks for this paper is 50.

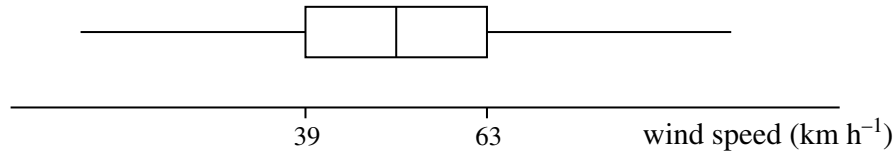
Questions carrying smaller numbers of marks are printed earlier in the paper, and questions carrying larger numbers of marks later in the paper.

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1



Measurements of wind speed on a certain island were taken over a period of one year. A box-and-whisker plot of the data obtained is displayed above, and the values of the quartiles are as shown. It is suggested that wind speed can be modelled approximately by a normal distribution with mean  $\mu$  km h<sup>-1</sup> and standard deviation  $\sigma$  km h<sup>-1</sup>.

(i) Estimate the value of  $\mu$ . [1]

(ii) Estimate the value of  $\sigma$ . [3]

- 2 Two unbiased tetrahedral dice each have four faces numbered 1, 2, 3 and 4. The two dice are thrown together and the sum of the numbers on the faces on which they land is noted. Find the expected number of occasions on which this sum is 7 or more when the dice are thrown together 200 times. [4]

- 3 Maria chooses toast for her breakfast with probability 0.85. If she does not choose toast then she has a bread roll. If she chooses toast then the probability that she will have jam on it is 0.8. If she has a bread roll then the probability that she will have jam on it is 0.4.

(i) Draw a fully labelled tree diagram to show this information. [2]

(ii) Given that Maria did **not** have jam for breakfast, find the probability that she had toast. [4]

- 4 (a) (i) Find how many different four-digit numbers can be made using only the digits 1, 3, 5 and 6 with no digit being repeated. [1]

(ii) Find how many different odd numbers greater than 500 can be made using some or all of the digits 1, 3, 5 and 6 with no digit being repeated. [4]

- (b) Six cards numbered 1, 2, 3, 4, 5, 6 are arranged randomly in a line. Find the probability that the cards numbered 4 and 5 are **not** next to each other. [3]

- 5 In a particular discrete probability distribution the random variable  $X$  takes the value  $\frac{120}{r}$  with probability  $\frac{r}{45}$ , where  $r$  takes all integer values from 1 to 9 inclusive.

(i) Show that  $P(X = 40) = \frac{1}{15}$ . [2]

(ii) Construct the probability distribution table for  $X$ . [3]

(iii) Which is the modal value of  $X$ ? [1]

(iv) Find the probability that  $X$  lies between 18 and 100. [2]

- 6 The following table gives the marks, out of 75, in a pure mathematics examination taken by 234 students.

Marks	1–20	21–30	31–40	41–50	51–60	61–75
Frequency	40	34	56	54	29	21

- (i) Draw a histogram on graph paper to represent these results. [5]
- (ii) Calculate estimates of the mean mark and the standard deviation. [4]
- 7 The weights,  $X$  grams, of bars of soap are normally distributed with mean 125 grams and standard deviation 4.2 grams.
- (i) Find the probability that a randomly chosen bar of soap weighs more than 128 grams. [3]
- (ii) Find the value of  $k$  such that  $P(k < X < 128) = 0.7465$ . [4]
- (iii) Five bars of soap are chosen at random. Find the probability that more than two of the bars each weigh more than 128 grams. [4]

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