Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

0830110950

MATHEMATICS **9709/63**

Paper 6 Probability & Statistics 1 **(S1)** **May/June 2017**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: List of Formulae (MF9)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

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.

This document consists of **12** printed pages.

© UCLES 2017

1 A biased die has faces numbered 1 to 6. The probabilities of the die landing on 1, 3 or 5 are each equal to 0.1. The probabilities of the die landing on 2 or 4 are each equal to 0.2. The die is thrown twice. Find the probability that the sum of the numbers it lands on is 9. [4]

2 The probability that George goes swimming on any day is $\frac{1}{3}$. Use an approximation to calculate the probability that in 270 days George goes swimming at least 100 times. [5]

© UCLES 2017

[Turn over

3 A shop sells two makes of coffee, Café Premium and Café Standard. Both coffees come in two sizes, large jars and small jars. Of the jars on sale, 65% are Café Premium and 35% are Café Standard. Of the Café Premium, 40% of the jars are large and of the Café Standard, 25% of the jars are large. A jar is chosen at random.

(i) Find the probability that the jar is small. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Find the probability that the jar is Café Standard given that it is large. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

© UCLES 2017

4 **(a)** The random variable X has the distribution $N(\mu, \sigma^2)$, where $\mu = 1.5\sigma$. A random value of X is chosen. Find the probability that this value of X is greater than 0. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) The life of a particular type of torch battery is normally distributed with mean 120 hours and standard deviation s hours. It is known that 87.5% of these batteries last longer than 70 hours. Find the value of s. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

5 Hebe attempts a crossword puzzle every day. The number of puzzles she completes in a week (7 days) is denoted by X.

(i) State two conditions that are required for X to have a binomial distribution. [2]

.....

.....

.....

.....

.....

.....

On average, Hebe completes 7 out of 10 of these puzzles.

(ii) Use a binomial distribution to find the probability that Hebe completes at least 5 puzzles in a week. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(iii) Use a binomial distribution to find the probability that, over the next 10 weeks, Hebe completes 4 or fewer puzzles in exactly 3 of the 10 weeks. [3]

6 **(a)** Find how many numbers between 3000 and 5000 can be formed from the digits 1, 2, 3, 4 and 5,

(i) if digits are not repeated, [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) if digits can be repeated and the number formed is odd. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) A box of 20 biscuits contains 4 different chocolate biscuits, 2 different oatmeal biscuits and 14 different ginger biscuits. 6 biscuits are selected from the box at random.

(i) Find the number of different selections that include the 2 oatmeal biscuits. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Find the probability that fewer than 3 chocolate biscuits are selected. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

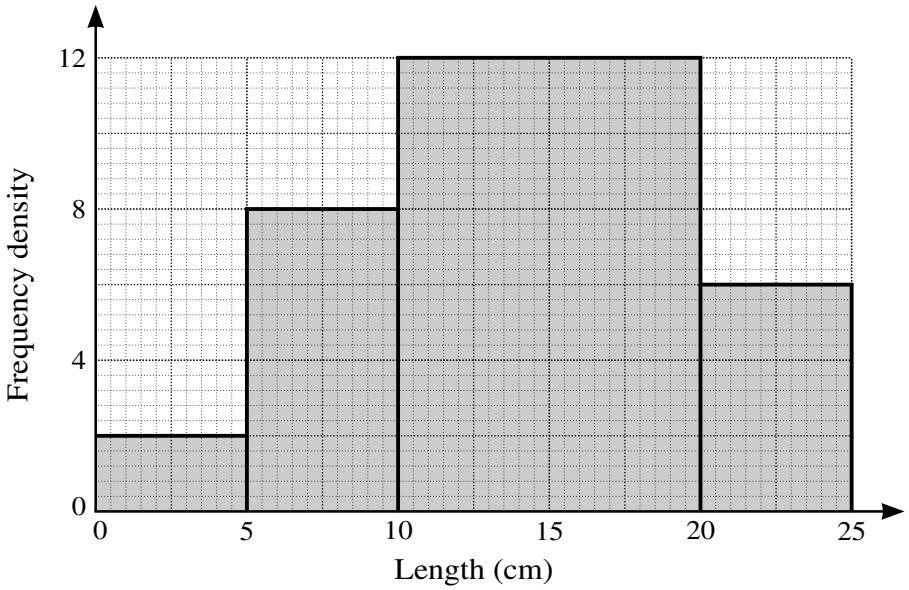
.....

.....

© UCLES 2017

[Turn over

7 The following histogram represents the lengths of worms in a garden.



(i) Calculate the frequencies represented by each of the four histogram columns. [2]

.....

.....

.....

.....

.....

.....

.....

.....

(ii) On the grid on the next page, draw a cumulative frequency graph to represent the lengths of worms in the garden. [4]

© UCLES 2017



(iii) Use your graph to estimate the median and interquartile range of the lengths of worms in the garden. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[Question 7 (iv) is printed on the next page.]

(iv) Calculate an estimate of the mean length of worms in the garden. [2]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.