Cambridge International AS & A Level

**Cambridge International Examinations**
Cambridge International Advanced Subsidiary and Advanced Level

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*3180209555*

**MATHEMATICS** **9709/63**

Paper 6 Probability & Statistics 1 **(S1)** **May/June 2018**

**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 in the space provided. If additional space is required, you should use the lined page at the end of this booklet. The question number(s) must be clearly shown.
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.


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**1** The masses in kilograms of 50 children having a medical check-up were recorded correct to the nearest kilogram. The results are shown in the table.

| Mass (kg) | 10 – 14 | 15 – 19 | 20 – 24 | 25 – 34 | 35 – 59 |
|---|---|---|---|---|---|
| Frequency | 6 | 12 | 14 | 10 | 8 |

**(i)** Find which class interval contains the lower quartile. [1]

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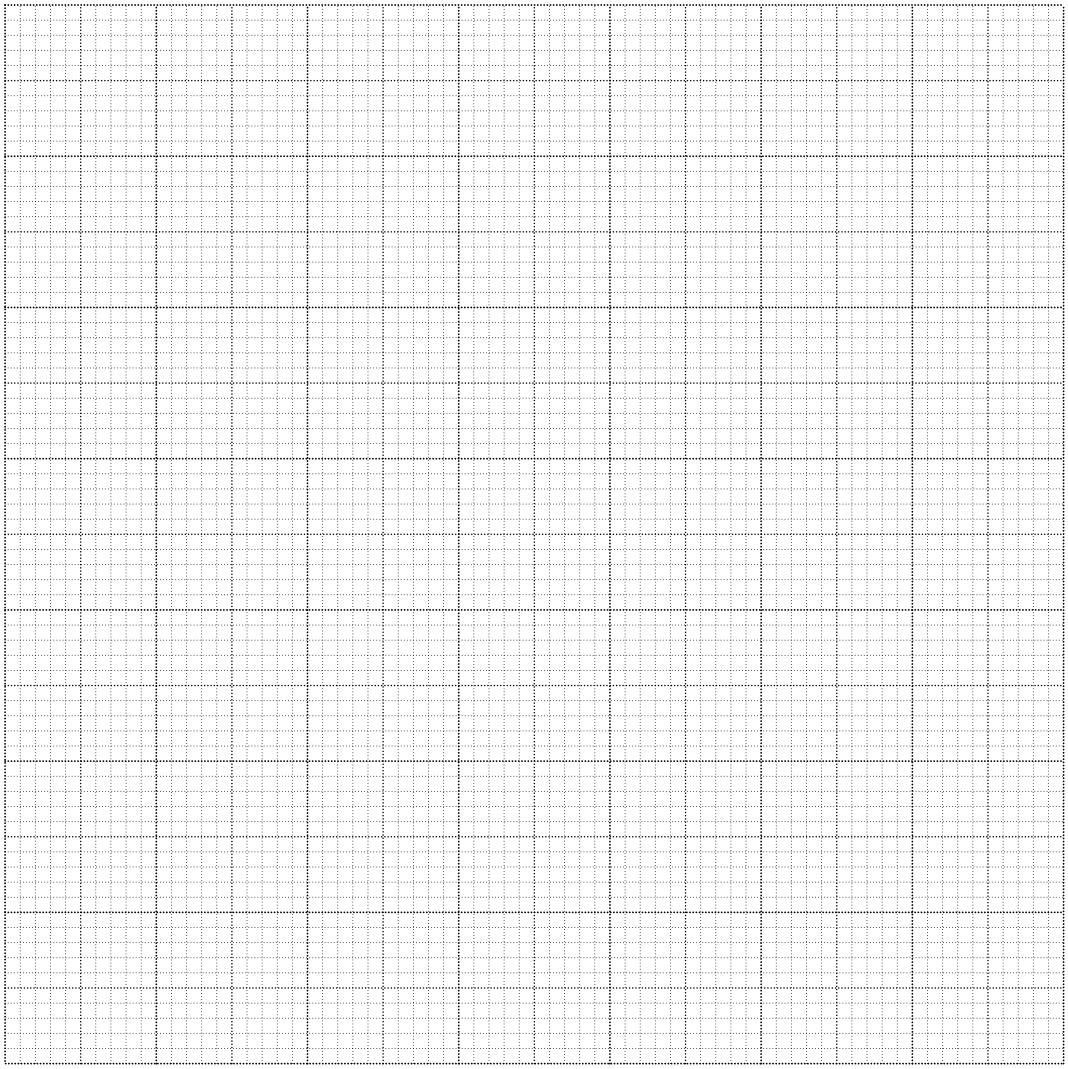
**(ii)** On the grid, draw a histogram to illustrate the data in the table. [4]



**2** The random variable $X$ has the distribution $N(-3, \sigma^2)$. The probability that a randomly chosen value of $X$ is positive is 0.25.

**(i)** Find the value of $\sigma$. [3]

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**(ii)** Find the probability that, of 8 random values of $X$, fewer than 2 will be positive. [3]

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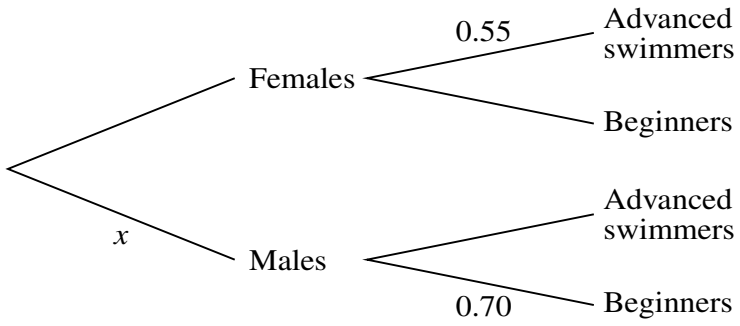
**3** The members of a swimming club are classified either as 'Advanced swimmers' or 'Beginners'. The proportion of members who are male is $x$, and the proportion of males who are Beginners is 0.7. The proportion of females who are Advanced swimmers is 0.55. This information is shown in the tree diagram.




For a randomly chosen member, the probability of being an Advanced swimmer is the same as the probability of being a Beginner.

**(i)** Find $x$. [3]

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**(ii)** Given that a randomly chosen member is an Advanced swimmer, find the probability that the member is male. [3]

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**4** Farfield Travel and Lacket Travel are two travel companies which arrange tours abroad. The numbers of holidays arranged in a certain week are recorded in the table below, together with the means and standard deviations of the prices.

| | Number of holidays | Mean price ($) | Standard deviation ($) |
|---|---|---|---|
| Farfield Travel | 30 | 1500 | 230 |
| Lacket Travel | 21 | 2400 | 160 |

**(i)** Calculate the mean price of all 51 holidays. [2]

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**(ii)** The prices of individual holidays with Farfield Travel are denoted by $\$x_F$ and the prices of individual holidays with Lacket Travel are denoted by $\$x_L$. By first finding $\Sigma x_F^2$ and $\Sigma x_L^2$, find the standard deviation of the prices of all 51 holidays. [5]

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**5** A game is played with 3 coins, $A$, $B$ and $C$. Coins $A$ and $B$ are biased so that the probability of obtaining a head is 0.4 for coin $A$ and 0.75 for coin $B$. Coin $C$ is not biased. The 3 coins are thrown once.

**(i)** Draw up the probability distribution table for the number of heads obtained. [5]

**(ii)** Hence calculate the mean and variance of the number of heads obtained. [3]

**6** The diameters of apples in an orchard have a normal distribution with mean 5.7 cm and standard deviation 0.8 cm. Apples with diameters between 4.1 cm and 5 cm can be used as toffee apples.

**(i)** Find the probability that an apple selected at random can be used as a toffee apple. [3]

**(ii)** 250 apples are chosen at random. Use a suitable approximation to find the probability that fewer than 50 can be used as toffee apples. [5]

**7** Find the number of ways the 9 letters of the word SEVENTEEN can be arranged in each of the following cases.

**(i)** One of the letter Es is in the centre with 4 letters on either side. [2]

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**(ii)** No E is next to another E. [3]

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5 letters are chosen from the 9 letters of the word SEVENTEEN.

**(iii)** Find the number of possible selections which contain exactly 2 Es and exactly 2 Ns. [1]

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**(iv)** Find the number of possible selections which contain at least 2 Es. [4]

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## Additional Page

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