Cambridge International AS & A Level

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

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| CANDIDATE NAME | | | | | | | | | |
| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | |

*9389620414*

**MATHEMATICS** **9709/62**

Paper 6 Probability & Statistics 1 **(S1)** **October/November 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 **14** printed pages and **2** blank pages.




CAMBRIDGE International Examinations

**1** **(i)** How many different arrangements are there of the 11 letters in the word MISSISSIPPI? [2]

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**(ii)** Two letters are chosen at random from the 11 letters in the word MISSISSIPPI. Find the probability that these two letters are the same. [3]

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**2** The following back-to-back stem-and-leaf diagram shows the reaction times in seconds in an experiment involving two groups of people, *A* and *B*.

| *A* | | | *B* | |
|---|---|---|---|---|
| (4) | 4 2 0 0 | 20 | 5 6 7 | (3) |
| (5) | 9 8 5 0 0 | 21 | 1 2 2 3 7 7 | (6) |
| (8) | 9 8 7 5 3 2 2 2 | 22 | 1 3 5 6 6 8 9 | (7) |
| (6) | 8 7 6 5 2 1 | 23 | 4 5 7 8 8 9 9 9 | (8) |
| (3) | 8 6 3 | 24 | 2 4 5 6 7 8 8 | (7) |
| (1) | 0 | 25 | 0 2 7 8 | (4) |

Key: 5 | 22 | 6 means a reaction time of 0.225 seconds for *A* and 0.226 seconds for *B*

**(i)** Find the median and the interquartile range for group *A*. [3]

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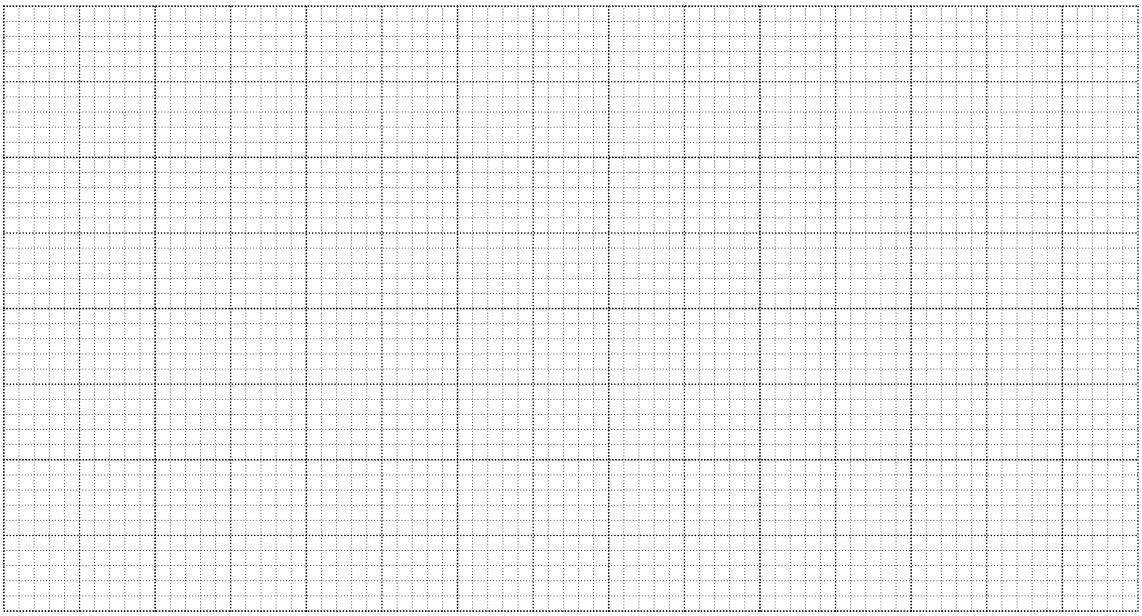
The median value for group *B* is 0.235 seconds, the lower quartile is 0.217 seconds and the upper quartile is 0.245 seconds.

**(ii)** Draw box-and-whisker plots for groups *A* and *B* on the grid. [3]



**3** Jake attempts the crossword puzzle in his daily newspaper every day. The probability that he will complete the puzzle on any given day is 0.75, independently of all other days.

**(i)** Find the probability that he will complete the puzzle at least three times over a period of five days. [3]

Kenny also attempts the puzzle every day. The probability that he will complete the puzzle on a Monday is 0.8. The probability that he will complete it on a Tuesday is 0.9 if he completed it on the previous day and 0.6 if he did not complete it on the previous day.

**(ii)** Find the probability that Kenny will complete the puzzle on at least one of the two days Monday and Tuesday in a randomly chosen week. [3]

**4** **(i)** Find the number of different ways that 5 boys and 6 girls can stand in a row if all the boys stand together and all the girls stand together. [3]

**(ii)** Find the number of different ways that 5 boys and 6 girls can stand in a row if no boy stands next to another boy. [3]

**5** The Quivers Archery club has 12 Junior members and 20 Senior members. For the Junior members, the mean age is 15.5 years and the standard deviation of the ages is 1.2 years. The ages of the Senior members are summarised by $\Sigma y = 910$ and $\Sigma y^2 = 42\,850$, where $y$ is the age of a Senior member in years.

**(i)** Find the mean age of all 32 members of the club. [2]

**(ii)** Find the standard deviation of the ages of all 32 members of the club. [4]

**6** A fair red spinner has 4 sides, numbered 1, 2, 3, 4. A fair blue spinner has 3 sides, numbered 1, 2, 3. When a spinner is spun, the score is the number on the side on which it lands. The spinners are spun at the same time. The random variable $X$ denotes the score on the red spinner minus the score on the blue spinner.

**(i)** Draw up the probability distribution table for $X$. [3]

**(ii)** Find Var($X$). [3]

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**(iii)** Find the probability that $X$ is equal to 1, given that $X$ is non-zero. [3]

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**7** **(a)** The time, $X$ hours, for which students use a games machine in any given day has a normal distribution with mean 3.24 hours and standard deviation 0.96 hours.

**(i)** On how many days of the year (365 days) would you expect a randomly chosen student to use a games machine for less than 4 hours? [3]

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**(ii)** Find the value of $k$ such that $P(X > k) = 0.2$. [3]

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**(iii)** Find the probability that the number of hours for which a randomly chosen student uses a games machine in a day is within 1.5 standard deviations of the mean. [3]

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**(b)** The variable $Y$ is normally distributed with mean $\mu$ and standard deviation $\sigma$, where $4\sigma = 3\mu$ and $\mu \neq 0$. Find the probability that a randomly chosen value of $Y$ is positive. [3]

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## Additional Page

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