Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

0123456789

MATHEMATICS **9709/05**

Paper 5 Probability & Statistics 1 **For examination from 2020**

SPECIMEN PAPER **1 hour 15 minutes**

You must answer on the question paper.

You will need: List of formulae (MF19)

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **14** pages. Blank pages are indicated.

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1 The following back-to-back stem-and-leaf diagram shows the annual salaries of a group of 39 females and 39 males.

Females			Males	
(4)	5 2 0 0	20	3	(1)
(9)	9 8 8 7 6 4 0 0 0	21	0 0 7	(3)
(8)	8 7 5 3 3 1 0 0	22	0 0 4 5 6 6	(6)
(6)	6 4 2 1 0 0	23	0 0 2 3 3 5 6 7 7	(9)
(6)	7 5 4 0 0 0	24	0 1 1 2 5 5 6 8 8 9	(10)
(4)	9 5 0 0	25	3 4 5 7 7 8 9	(7)
(2)	5 0	26	0 4 6	(3)

Key: 2 | 20 | 3 means \$20 200 for females and \$20 300 for males.

(a) Find the median and the quartiles of the females' salaries. [2]

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You are given that the median salary of the males is \$24 000, the lower quartile is \$22 600 and the upper quartile is \$25 300.

(b) Draw a pair of box-and-whisker plots in a single diagram on the grid below to represent the data. [3]

2 A summary of the speeds, x kilometres per hour, of 22 cars passing a certain point gave the following information:

$$\Sigma(x - 50) = 81.4 \quad \text{and} \quad \Sigma(x - 50)^2 = 671.0.$$

Find the variance of the speeds and hence find the value of Σx^2. [4]

3 A book club sends 6 paperback and 2 hardback books to Mrs Hunt. She chooses 4 of these books at random to take with her on holiday. The random variable X represents the number of paperback books she chooses.

(a) Show that the probability that she chooses exactly 2 paperback books is $\frac{3}{14}$. [2]

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(b) Draw up the probability distribution table for X. [3]

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(c) You are given that $E(X) = 3$.

Find $Var(X)$. [2]

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4 A petrol station finds that its daily sales, in litres, are normally distributed with mean 4520 and standard deviation 560.

(a) Find on how many days of the year (365 days) the daily sales can be expected to exceed 3900 litres. [4]

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The daily sales at another petrol station are X litres, where X is normally distributed with mean m and standard deviation 560. It is given that $P(X > 8000) = 0.122$.

(b) Find the value of m. [3]

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(c) Find the probability that daily sales at this petrol station exceed 8000 litres on fewer than 2 of 6 randomly chosen days. [3]

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5 A fair six-sided die, with faces marked 1, 2, 3, 4, 5, 6, is thrown 90 times.

(a) Use an approximation to find the probability that a 3 is obtained fewer than 18 times. [4]

(b) Justify your use of the approximation in part **(a)**. [1]

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On another occasion, the same die is thrown repeatedly until a 3 is obtained.

(c) Find the probability that obtaining a 3 requires fewer than 7 throws. [2]

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6 A group of 8 friends travels to the airport in two taxis, P and Q. Each taxi can take 4 passengers.

(a) The 8 friends divide themselves into two groups of 4, one group for taxi P and one group for taxi Q, with Jon and Sarah travelling in the same taxi.

Find the number of different ways in which this can be done. [3]

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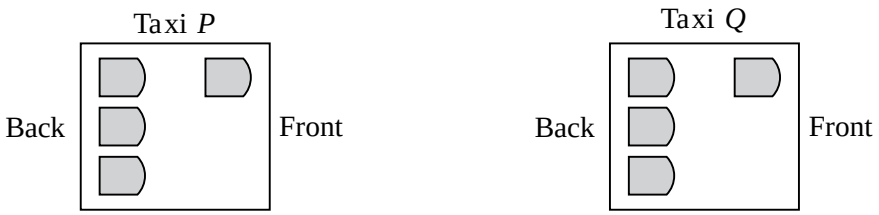

Each taxi can take 1 passenger in the front and 3 passengers in the back (see diagram). Mark sits in the front of taxi *P* and Jon and Sarah sit in the back of taxi *P* next to each other.

(b) Find the number of different seating arrangements that are now possible for the 8 friends. [4]

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7 Bag A contains 4 balls numbered 2, 4, 5, 8. Bag B contains 5 balls numbered 1, 3, 6, 8, 8. Bag C contains 7 balls numbered 2, 7, 8, 8, 8, 8, 9. One ball is selected at random from each bag.

- Event X is 'exactly two of the selected balls have the same number'.
- Event Y is 'the ball selected from bag A has number 4'.

(a) Find $\mathrm{P}(X)$. [5]

(b) Find $P(X \cap Y)$ and hence determine whether or not events X and Y are independent. [3]

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(c) Find the probability that two balls are numbered 2, given that exactly two of the selected balls have the same number. [2]

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Additional page

If you use the following lined page to complete the answer(s) to any question(s), the question number(s) must be clearly shown.

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