



Cambridge International AS & A Level

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--



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.

1 The following back to back stem-and leaf diagram shows the annual salaries of a group of 9 females and 9 males.

Females			Males	
4	5200	0	3	1
9	988764000	1	0 07	3
8	87533100	2	004566	6
6	642100	3	0 02335677	9
6	754000	4	0112556889	10
4	9500	5	3457789	7
2	50	6	046	3

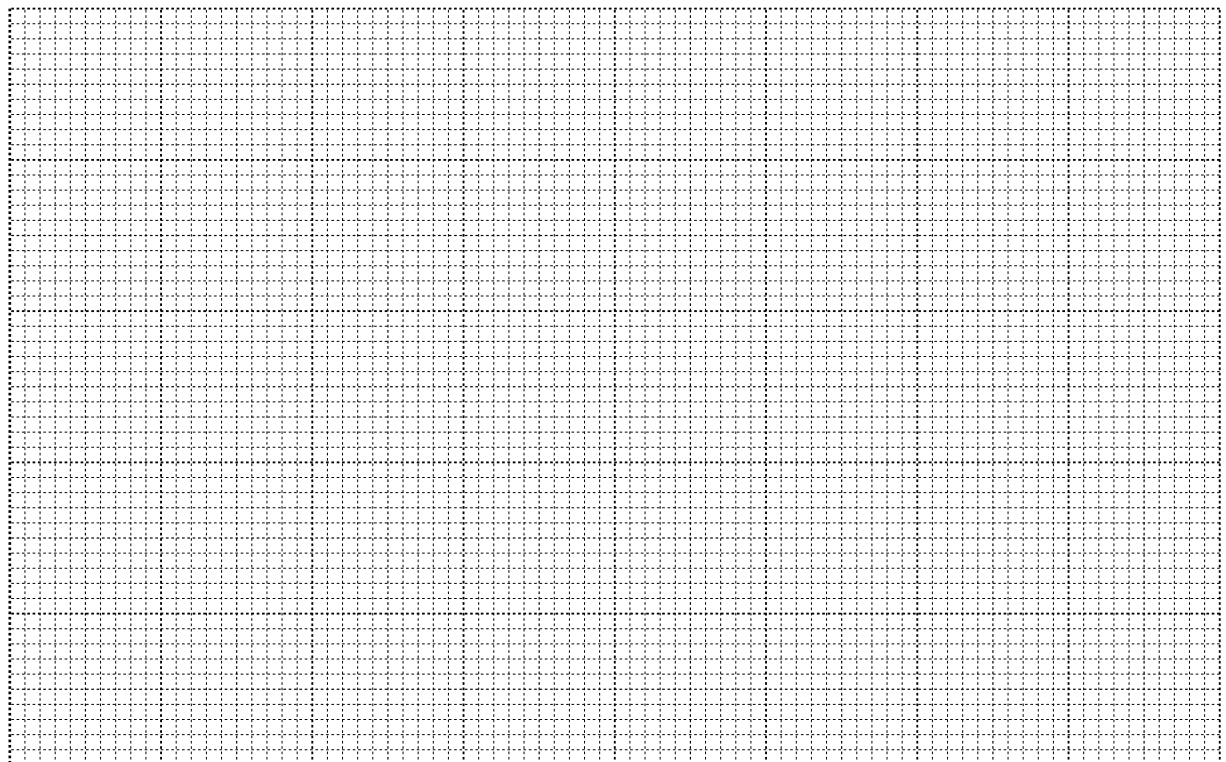
Key 2 0 3 means 0 0 0 females and 0 0 0 males.

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

. . .
 . . .
 . . .

You are given that the mean salary of the males is \$ 0 the lower quartile is \$ 0 and the upper quartile is \$ 50

(b) Draw a pair of back to back stem-and leaf diagrams in a suitable diagram to represent the data. [3]



3

- 2 A summary of the speed, x kilometres per hour, of 2 cars passing a certain point is given in the following information

$$\Sigma(x - 50) = 8 \text{ and } \Sigma(x - 50)^2 = 98$$

Find the variance of the speed and the efficient value of Σx^2 . [4]

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

3 A club sold 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]

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

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

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

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

Find $\text{Var}(X)$.

[2]

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

4 A petrol station finds that its daily sales, in litres, are normally distributed with mean 90 and standard deviation 10.

(a) Find the maximum number of days in a year (365 days) that the daily sales can be expected to exceed 90 litres. [4]

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

The daily sales at another petrol station are X litres, where X is normally distributed with mean m and standard deviation σ . It is given that $P(X > 90) = 0.05$.

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

• • • •

• • • •

• • • •

• • • •

• • • •

• • • •

- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .

(c) Find the probability that daily sales at this petrol station exceed 0 litres or fewer than 266 each day. [3]

- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .
- . . .

5 A fair six sided die, with its faces marked 1 to 6, is thrown 10 times.

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

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

(b) Justify each of the approximations in part (a). [1]

·	·	·
·	·	·
·	·	·

On each occasion the same die is thrown repeatedly until a 3 is obtained

(c) Find the probability that a given 3 requires fewer than 10 throws. [2]

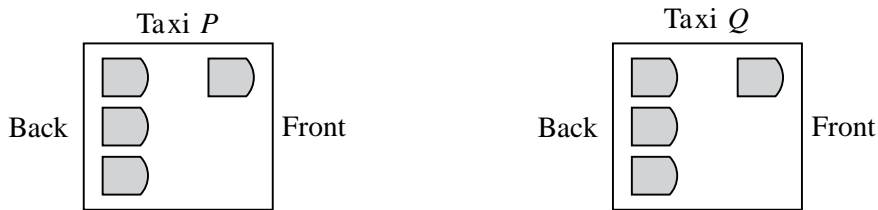
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·
·	·	·

6 A group of 8 friends travel to the airport to purchase tickets, and each buys a return ticket for a different flight.

(a) The 8 friends divide themselves into two groups of 4, one group for flight P and one group for flight Q, with the same arrangements for each.

Find the number of different ways in which the tickets can be bought. [3]

A grid of 20 rows and 4 columns of dots for writing the answer.



Each taxi can take 1 passenger in the front and 3 passengers in the back (see diagram). Mark seats in the front of taxi P and mark seats in the back of taxi P as available.

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

.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.

7 Bag A contains 4 balls marked red 2, 4, 5, 8. Bag B contains 5 balls marked red 1, 3, 6, 8, 8. Bag C contains 7 balls marked red 2, 2, 2, 2, 2, 2, 2. A 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 $P(X)$.

[5]

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

• •

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

.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.

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

.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.

Additional page

If you see the following lines, please do not attempt to complete the answer(s) to any question(s), the question number(s) must be clearly written

• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •
• • •

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.

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