



## Cambridge International AS & A Level

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**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 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		9
4	9500	5	3457789		9
2	50	6	046		3

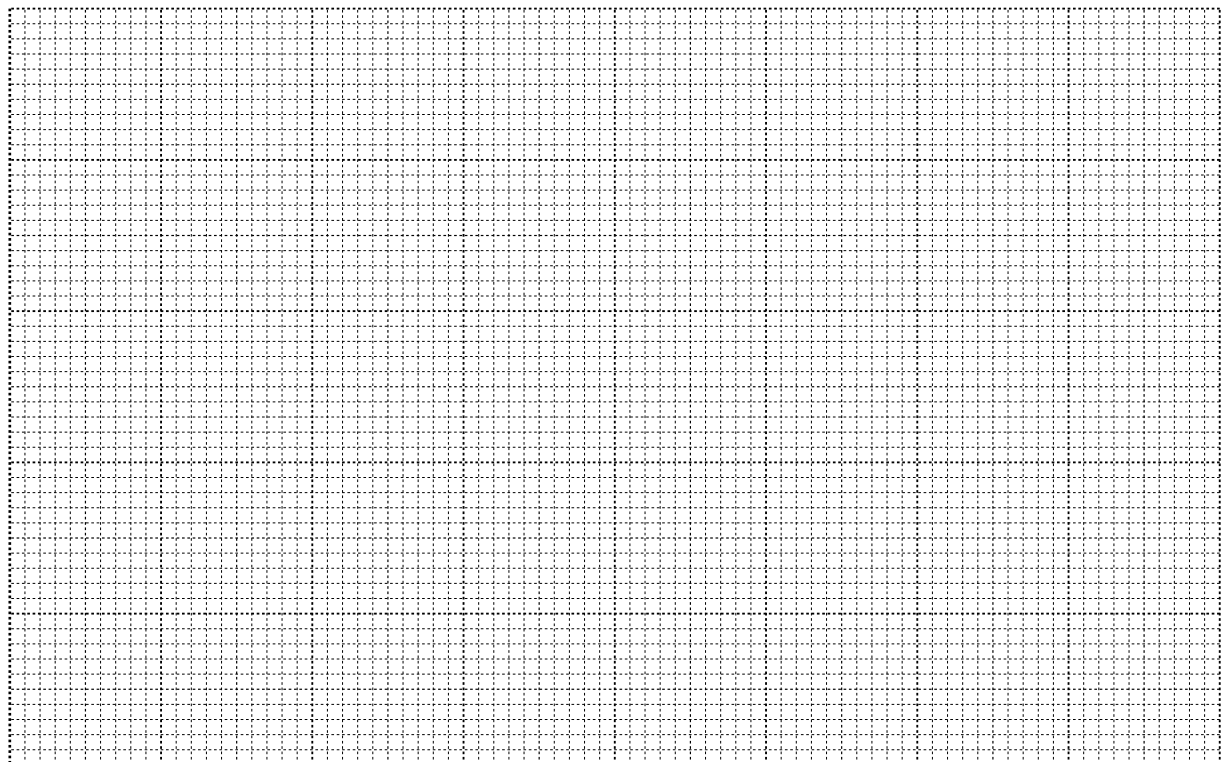
Key: 2 0 3 means 2 0 3 females and 6 0 3 males.

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

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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]



2 A summary of the speed,  $x$  kilometres per hour, of 2 cars passing a certain point on the following information

$$\sum(x - 5) = 8 \quad \text{and} \quad \sum(x - 5)^2 = 6$$

Find the variance of the speed and the efficient value of  $\sum x^2$ . [4]

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3 A club send 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  $\text{Var}(X)$ .

[2]

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4 A petrol station finds that its daily sales, in litres, are normally distributed with mean 8 and standard deviation 0.5.

(a) Find the maximum number of petrol pumps that the petrol station can expect to exceed 10 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 1. It is given that  $P(X > 9) = 0.1$ .

(b) Find a value for  $m$ . [3]

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

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

(a) Use an appropriate method of estimation to find the probability that a 3 is obtained fewer than 10 times. [4]

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(b) Justify the approximation in part (a). [1]

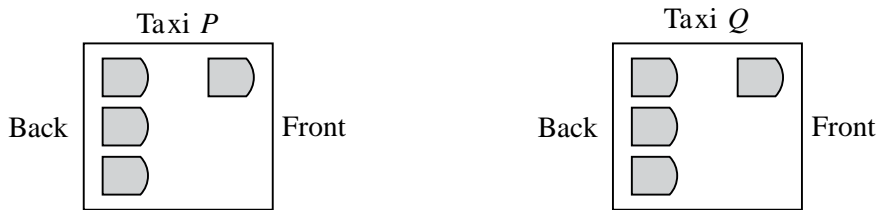
. . . . .

On each occasion the same die is thrown repeatedly in a fixed order

(c) Find the probability that at least 3 of the throws will be 4's. [2]

. . . . .





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 **not** available.

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

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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 1, 2, 3, 4, 5, 6, 8. 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]

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

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

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Additional page

If possible follow guidelines to complete the answer(s) to any question(s), the question number(s) must be clearly written

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