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Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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MATHEMATICS **9709/53**

Paper 5 Probability & Statistics 1 **May/June 2024**

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 **16** pages. Any blank pages are indicated.

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[Turn over

1 The numbers on the faces of a fair six-sided dice are 1, 2, 2, 3, 3, 3. The random variable X is the total score when the dice is rolled twice.

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

(b) Find the value of Var(X). [3]

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(c) Find the probability that X is even given that $X > 3$. [2]

2 In a certain country, the heights of the adult population are normally distributed with mean 1.64 m and standard deviation 0.25 m.

(a) Find the probability that an adult chosen at random from this country will have height greater than 1.93 m. [3]

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In another country, the heights of the adult population are also normally distributed. 33% of the adult population have height less than 1.56 m. 25% of the adult population have height greater than 1.86 m.

(b) Find the mean and the standard deviation of this distribution. [5]

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3 Box *A* contains 6 green balls and 3 yellow balls.

Box *B* contains 4 green balls and x yellow balls.

A ball is chosen at random from box *A* and placed in box *B*. A ball is then chosen at random from box *B*.

(a) Draw a tree diagram to represent this information, showing the probability on each of the branches. [4]

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The probability that both the balls chosen are the same colour is $\frac{8}{15}$.

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

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4 The times taken, in seconds, by 15 members of each of two swimming clubs, the Penguins and the Dolphins, to swim 50 metres are shown in the following table.

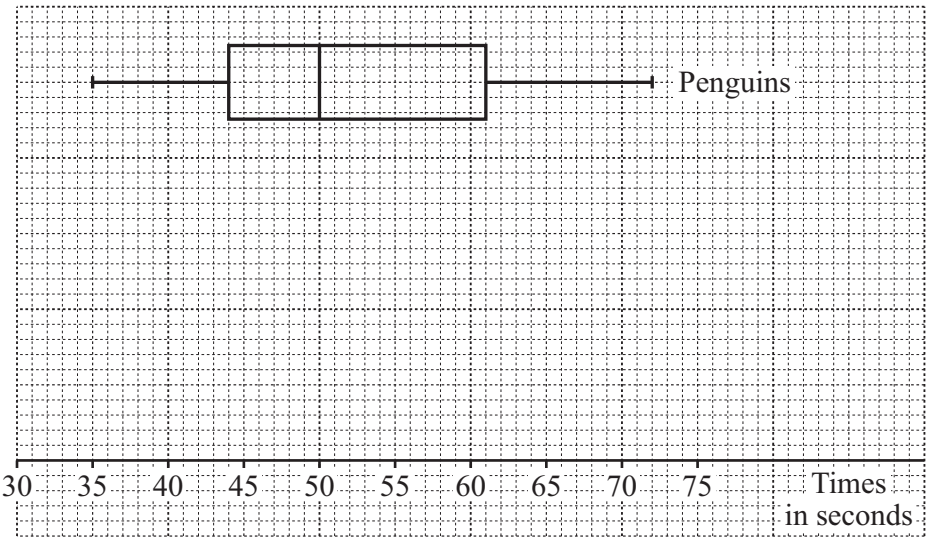
Penguins	35	39	42	44	45	45	48	50	56	58	59	61	66	68	72
Dolphins	36	41	43	48	49	49	50	51	54	56	56	60	61	64	71

(a) Draw a back-to-back stem-and-leaf diagram to represent this information, with Penguins on the left-hand side. [4]

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The diagram shows a box-and-whisker plot representing the times for the Penguins.

(b) On the same diagram, draw a box-and-whisker plot to represent the times for the Dolphins. [3]



(c) Hence state **one** difference between the distributions of the times for the Penguins and the Dolphins. [1]

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5 Salah decides to attempt the crossword puzzle in his newspaper each day. The probability that he will complete the puzzle on any given day is 0.65, independent of other days.

(a) Find the probability that Salah completes the puzzle for the first time on the 5th day. [1]

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(b) Find the probability that Salah completes the puzzle for the second time on the 5th day. [2]

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(c) Find the probability that Salah completes the puzzle fewer than 5 times in a week (7 days). [3]

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(d) Use a suitable approximation to find the probability that Salah completes the puzzle more than 50 times in a period of 84 days. [5]

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6 **(a)** How many different arrangements are there of the 9 letters in the word RECORDERS? [1]

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(b) How many different arrangements are there of the 9 letters in the word RECORDERS in which there is an E at the beginning, an E at the end and the three Rs are not all together? [3]

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The 9 letters of the word RECORDERS are divided at random into two groups: a group of 5 letters and a group of 4 letters.

(c) Find the probability that the three Rs are in the same group. [4]

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