

Cambridge International AS & A Level

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MATHEMATICS 9709/51

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.

| 4 | | | 0. | • | 1 | | | |
|---|----|---------|------|-----|--------|-----|-----|-------|
| | AS | summary | ot i | 20° | values | ot. | x 9 | orves |
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$$\Sigma(x-30) = 439, \qquad \Sigma(x-30)^2 = 12405.$$

A summary of another 25 values of x gives

$$\Sigma(x-30) = 470, \qquad \Sigma(x-30)^2 = 11346.$$

| Find the mean of all 45 values of x . | [2] |
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| Find the standard deviation of all 45 values of x . | [2] |
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| | Find the mean of all 45 values of x. Find the standard deviation of all 45 values of x. |

2

The lengths of the tails of adult raccoons of a certain species are normally distributed with mean $28\,\mathrm{cm}$

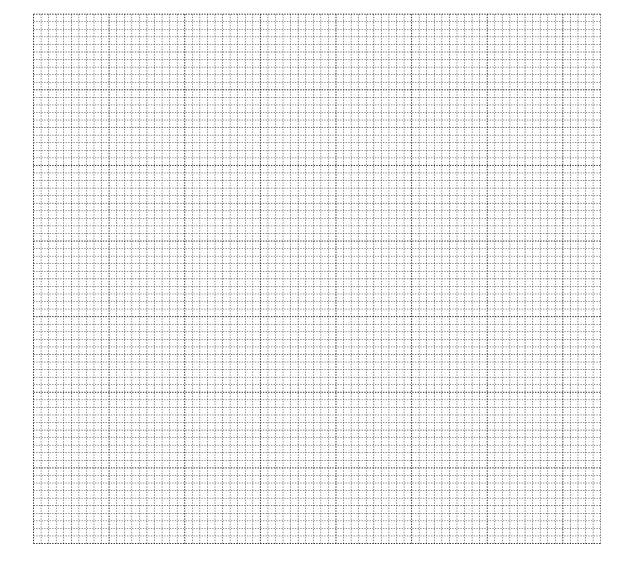
| | 23 cm and 35 cm. | |
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| via | masses of adult raccoons of this species are normally distributed with mean 8.5 kg and sation σ kg. 75% of adult raccoons of this species have mass greater than 7.6 kg. | sta |
| via | | sta |
| via | ation σ kg. 75% of adult raccoons of this species have mass greater than 7.6 kg. | sta |
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| via | ation σ kg. 75% of adult raccoons of this species have mass greater than 7.6 kg. | sta |

3 The heights, in cm, of 200 adults in Barimba are summarised in the following table.

| Height (h cm) | $130 \leqslant h < 150$ | $150 \leqslant h < 160$ | $160 \leqslant h < 170$ | $170 \leqslant h < 175$ | $175 \leqslant h < 195$ |
|---------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Frequency | 16 | 32 | 76 | 64 | 12 |

(a) Draw a histogram to represent this information.

[4]



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| | ner throws are made during that turn. A player who obtains a 4 in their turn scores 1 point. | |
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| | Show that the probability that a player obtains a 4 in one turn is $\frac{37}{64}$. | [2] |
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| 10 | o and Yao play this game. | |
| | o and Yao play this game. Find the probability that neither Xeno nor Yao score any points in their first two turns. | [1] |
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| J | Find the probability that Xeno scores 2 more points than Yao. |
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| | Find the probability that in a week (7 days) it snows on at least five days. | |
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| A w | eek in which it snows on at least five days out of seven is called a 'white' week. | |
| (b) | Find the probability that in three randomly chosen weeks at least one is a white week. | |
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In a different area in the Arctic, the probability that a week is a white week is $0.8\ .$

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| 6 | Harry | has | three | coins |

- One coin is biased so that the probability of obtaining a head when it is thrown is $\frac{1}{3}$.
- The second coin is biased so that the probability of obtaining a head when it is thrown is $\frac{1}{4}$.
- The third coin is biased so that the probability of obtaining a head when it is thrown is $\frac{1}{5}$.

Harry throws the three coins. The random variable X is the number of heads that he obtains.

| Oraw up the probability distribution table for X . | [4] |
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Harry has two other coins, each of which is biased so that the probability of obtaining a head when it is thrown is p. He throws all five coins at the same time. The random variable Y is the number of heads that he obtains.

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| a) | How many different arrangements are there of these 8 digits? | [1] |
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| b) | Find the number of different arrangements of the 8 digits in which there is a 2 at the beginning, at the end and the three 4s are not all together. | , a 2 [4] |
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Three digits are selected at random from the eight digits 1, 2, 2, 3, 4, 4, 4, 5.

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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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