



Cambridge International AS & A Level

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FURTHER MATHEMATICS

9231/04

Paper 4 Further Probability & Statistics

For examination from 2020

SPECIMEN PAPER

1 hour 30 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 **12** pages. Blank pages are indicated.

- 6 Aisha has a bag containing 3 red balls and 3 white balls. She selects a ball at random, notes its colour and returns it to the bag; the same process is repeated twice more. The number of red balls selected by Aisha is denoted by X .

(a) Find the probability generating function $G_X(t)$ of X . [2]

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Basant also has a bag containing 3 red balls and 3 white balls. He selects three balls at random, without replacement, from his bag. The number of red balls selected by Basant is denoted by Y .

(b) Find the probability generating function $G_Y(t)$ of Y . [3]

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The random variable Z is the total number of red balls selected by Aisha and Basant.

- (c) Find the probability generating function of Z , expressing your answer as a polynomial. [3]

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- (d) Use the probability generating function of Z to find $E(Z)$ and $\text{Var}(Z)$. [5]

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