



# Cambridge International AS & A Level

CANDIDATE  
NAME

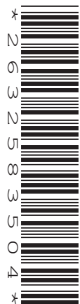
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## FURTHER MATHEMATICS

9231/43

Paper 4 Further Probability & Statistics

October/November 2020

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 [ ].

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5 Keira has two unbiased coins. She tosses both coins. The number of heads obtained by Keira is denoted by  $X$ .

(a) Find the probability generating function  $G_X(t)$  of  $X$ . [1]

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Hassan has three coins, two of which are biased so that the probability of obtaining a head when the coin is tossed is  $\frac{1}{3}$ . The corresponding probability for the third coin is  $\frac{1}{4}$ . The number of heads obtained by Hassan when he tosses these three coins 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 heads obtained by Keira and Hassan.

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

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6 The continuous random variable  $X$  has cumulative distribution function  $F$  given by

$$F(x) = \begin{cases} 0 & x < 0, \\ \frac{1}{60}(16x - x^2) & 0 \leq x \leq 6, \\ 1 & x > 6. \end{cases}$$

(a) Find the interquartile range of  $X$ . [4]

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(b) Find  $E(X^3)$ . [4]

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