



**Surname** \_\_\_\_\_

**Forename(s)** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number** \_\_\_\_\_

**Candidate Signature** \_\_\_\_\_

**I declare this is my own work.**

**A-level**

**FURTHER MATHEMATICS**

**Paper 3 Statistics**

**7367/3S**

**Friday 7 June 2024 Afternoon**

**Time allowed: 2 hours**

**At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.**

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J U N 2 4 7 3 6 7 3 S 0 1

## **MATERIALS**

- You must have the AQA Formulae and statistical tables booklet for A-level Mathematics and A-level Further Mathematics.
- You should have a graphical or scientific calculator that meets the requirements of the specification.
- You must ensure you have the other optional Question Paper/Answer Book for which you are entered (EITHER Discrete OR Mechanics). You will have 2 hours to complete BOTH papers.

## **INSTRUCTIONS**

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer ALL questions.
- You must answer each question in the space provided for that question.
- If you require extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do NOT write on blank pages.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.



## **INFORMATION**

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 50.**

## **ADVICE**

- **Unless stated otherwise, you may quote formulae, without proof, from the booklet.**
- **You do not necessarily need to use all the space provided.**

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



**Answer ALL questions in the spaces provided.**

- 1**      **The random variable  $X$  has a Poisson distribution with mean 16**

**Find the standard deviation of  $X$**

**Circle your answer. [1 mark]**

**4**

**8**

**16**

**256**



- 2 The random variable  $T$  has an exponential distribution with mean 2

Find  $P(T \leq 1.4)$

Circle your answer. [1 mark]

$$e^{-2.8}$$

$$e^{-0.7}$$

$$1 - e^{-0.7}$$

$$1 - e^{-2.8}$$

[Turn over]



- 3 The continuous random variable  $Y$  has CUMULATIVE distribution function

$$F(y) = \begin{cases} 0 & y < 2 \\ -\frac{1}{9}y^2 + \frac{10}{9}y - \frac{16}{9} & 2 \leq y < 5 \\ 1 & y \geq 5 \end{cases}$$

Find the median of  $Y$

Circle your answer. [1 mark]

2       $\frac{10 - 3\sqrt{2}}{2}$        $\frac{7}{2}$        $\frac{10 + 3\sqrt{2}}{2}$



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- 6** Over time it has been accepted that the mean retirement age for professional baseball players is 29.5 years old.

Imran claims that the mean retirement age is no longer 29.5 years old.

He takes a random sample of 5 recently retired professional baseball players and records their retirement ages,  $x$ . The results are

$$\sum x = 152.1 \quad \text{and} \quad \sum (x - \bar{x})^2 = 7.81$$

- 6 (a)** State an assumption that you should make about the distribution of the retirement ages to investigate Imran's claim. [1 mark]

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7 The random variable  $X$  has a discrete uniform distribution and takes values  $1, 2, 3, \dots, n$

The random variable  $Y$  has probability distribution function

$$P(Y = y) = \begin{cases} \frac{1}{n} & y = 13, 16, 19 \dots, 3n + 10 \\ 0 & \text{otherwise} \end{cases}$$

7 (a) State the variance of  $X$  [1 mark]

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- 9 A company owns three shops, A, B and C, which are based in different towns.

Each shop gives a questionnaire to 250 of their customers, and every customer completes the questionnaire.

One of the questions asks whether the customer rates the shop as good, satisfactory or poor.

For shop A, 26% of customers rate the shop as good and 38% of customers rate the shop as poor.

For shop B, 32% of customers rate the shop as good and 40% of customers rate the shop as satisfactory.

Altogether, there are 210 good ratings and 261 satisfactory ratings.

- 9 (a) Complete the following table with the observed frequencies. [3 marks]

		RATING		
		GOOD	SATISFACTORY	POOR
SHOP	A			
	B			
	C			









- 10 The length,  $X$  cm, of teeth for an extinct breed of shark is known to have a normal distribution.

A random sample of 250 teeth has the following summary statistics.

$\bar{x}$	$s$
10.2	1.3

- 10 (a) Construct a 91% confidence interval for the population mean length of the shark teeth.

Give your limits to two decimal places.  
[3 marks]

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**10 (b)** The random sample is used to carry out a hypothesis test using the 9% level of significance.

The hypotheses are

$$H_0: \mu = 10.36$$

$$H_1: \mu \neq 10.36$$

**10 (b) (i)** State, with a reason, whether the null hypothesis will be rejected. [1 mark]

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**END OF QUESTIONS**









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For Examiner's Use	
Question	Mark
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<b>TOTAL</b>	

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**G/LM/Jun24/7367/3S/G4006/V3**

