

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

**Pearson Edexcel International Advanced Level**

**Tuesday 23 May 2023**

Morning (Time: 1 hour 30 minutes) **Paper reference** **WST02/01**

**Mathematics**

**International Advanced Subsidiary/Advanced Level**

**Statistics S2**

**You must have:**  
Mathematical Formulae and Statistical Tables (Yellow), calculator

Total Marks

**Candidates may use any calculator permitted by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.**

### Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear.  
Answers without working may not gain full credit.
- Values from the statistical tables should be quoted in full. If a calculator is used instead of the tables, the value should be given to an equivalent degree of accuracy.
- Inexact answers should be given to three significant figures unless otherwise stated.

### Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 7 questions in this question paper. The total mark for this paper is 75.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

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**Question 1 continued**

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**(Total for Question 1 is 11 marks)**

2. (a) State one characteristic of a population that would make a census a practical alternative to sampling.

(1)

A leisure centre has 2500 members.

It asks a sample of 300 members for their opinions on the fees it charges for using the centre.

For the sample,

- (b) (i) identify a suitable sampling frame,  
(ii) identify a sampling unit.

(2)

The leisure centre has the following pieces of information.

*A* is the list of the different types of membership that can be paid for by members.

*B* is the mean of the membership fees paid by **all** 2500 members.

*C* is the number in the **sample** of 300 members who are satisfied with the fees they pay.

- (c) State the piece of information that is a statistic.  
Give a reason for your answer.

(1)

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**Question 2 continued**

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**(Total for Question 2 is 4 marks)**

3. The continuous random variable  $X$  has probability density function given by

$$f(x) = \begin{cases} \frac{1}{48}(x^2 - 8x + c) & 2 \leq x \leq 5 \\ 0 & \text{otherwise} \end{cases}$$

- (a) Show that  $c = 31$  (3)
- (b) Find  $P(2 < X < 3)$  (2)
- (c) State whether the lower quartile of  $X$  is less than 3, equal to 3 or greater than 3  
Give a reason for your answer. (1)

Kei does the following to work out the mode of  $X$

$$f'(x) = \frac{1}{48}(2x - 8)$$

$$0 = \frac{1}{48}(2x - 8)$$

$$x = 4$$

Hence the mode of  $X$  is 4

Kei's answer for the mode is incorrect.

- (d) Explain why Kei's method does not give the correct value for the mode. (1)
- (e) Find the mode of  $X$   
Give a reason for your answer. (2)

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## Question 3 continued

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**Question 3 continued**

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**(Total for Question 3 is 9 marks)**

- (1)

(4)

(5)

- (1)

(2)

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**Question 4 continued**

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**Question 4 continued**

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**(Total for Question 4 is 13 marks)**



## Question 5 continued

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**Question 5 continued**

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**Question 5 continued**

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**(Total for Question 5 is 14 marks)**

6. Akia selects at random a value from the continuous random variable  $W$ , which is uniformly distributed over the interval  $[a, b]$

The probability that Akia selects a value greater than 17 is  $\frac{1}{5}$

The probability that Akia selects a value less than  $k$  is  $\frac{53}{60}$

- (a) Find the probability that Akia selects a value between 17 and  $k$  (2)

It is known that  $\text{Var}(W) = 75$

- (b) (i) Find the value of  $a$  and the value of  $b$  (4)

- (ii) Find the value of  $k$  (2)

- (c) Find  $P(-5 < W < 5)$  (2)

- (d) Find  $E(W^2)$  (2)

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**Question 6 continued**

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**Question 6 continued**

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**(Total for Question 6 is 12 marks)**

7. A bakery sells muffins individually at an average rate of 8 muffins per hour.

- (a) Find the probability that, in a randomly selected one-hour period, the bakery sells at least 4 but not more than 8 muffins.

(3)

A sample of 5 non-overlapping **half-hour** periods is selected at random.

- (b) Find the probability that the bakery sells fewer than 3 muffins in exactly 2 of these periods.

(5)

Given that 4 muffins were sold in a one-hour period,

- (c) find the probability that more muffins were sold in the first 15 minutes than in the last 45 minutes.

(4)

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## Question 7 continued

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**Question 7 continued**

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**(Total for Question 7 is 12 marks)****TOTAL FOR PAPER IS 75 MARKS**