

Please check the examination details below before entering your candidate information

Candidate surname	Other names
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Centre Number

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Candidate Number

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**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.

Turn over ►

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1. In a large population 40% of adults use online banking.

A random sample of 50 adults is taken.

The random variable  $X$  represents the number of adults in the sample that use online banking.

(a) Find

(i)  $P(X = 26)$  (2)

(ii)  $P(X \geq 26)$  (2)

(iii) the smallest value of  $k$  such that  $P(X \leq k) > 0.4$  (1)

A random sample of 600 adults is taken.

(b) (i) Find, using a normal approximation, the probability that no more than 222 of these 600 adults use online banking. (5)

(ii) Explain why a normal approximation is suitable in part (b)(i) (1)

Handwriting lines for the answer to part (b)(ii)

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4. (a) Given  $n$  is large, state a condition for which the binomial distribution  $B(n, p)$  can be reasonably approximated by a Poisson distribution. (1)

A manufacturer produces candles. Those candles that pass a quality inspection are suitable for sale.

It is known that 2% of the candles produced by the manufacturer are not suitable for sale.

A random sample of 125 candles produced by the manufacturer is taken.

- (b) Use a suitable approximation to find the probability that no more than 6 of the candles are **not** suitable for sale. (4)

The manufacturer also produces candle holders.

Charlie believes that 5% of candle holders produced by the factory have minor defects.

The manufacturer claims that the true proportion is less than 5%

To test the manufacturer's claim, a random sample of 30 candle holders is taken and none of them are found to contain minor defects.

- (c) (i) Carry out a test of the manufacturer's claim using a 5% level of significance. You should state your hypotheses clearly. (5)
- (ii) Give a reason why this is **not** an appropriate test. (1)

Ashley suggests changing the sample size to 50

- (d) Comment on whether or not this change would make the test appropriate. Give a reason for your answer. (2)

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