

Please check the examination details below before entering your candidate information

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**Pearson Edexcel International Advanced Level**

**Friday 6 June 2025**

Afternoon (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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**Pearson**



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**Question 1 continued**

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

- (1)

(2)

(2)

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## Question 2 continued

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**(Total for Question 2 is 10 marks)**



**Question 3 continued**

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**Question 3 continued**

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**(Total for Question 3 is 10 marks)**

4. A bag contains a large number of beads of the same size and shape. The beads are either black or white.

Black beads and white beads occur in the ratio 2 : 5 respectively.

In a game a player takes a random sample of 3 beads from the bag.

The player scores

- 4 points for each black bead taken
- 1 point for each white bead taken

The random variable  $X$  represents the total number of points for the 3 beads.

- (a) Find the sampling distribution of  $X$

(6)

A random sample of  $n$  sets of 3 beads is taken. The random variable  $Y$  represents the number of these  $n$  sets that have a total of exactly 9 points.

- (b) Calculate the minimum value of  $n$  such that  $P(Y \geq 1) > 0.95$

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## Question 4 continued

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**Question 4 continued**

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**(Total for Question 4 is 9 marks)**

5. In this question solutions relying entirely on calculator technology are not acceptable.

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

$$f(x) = \begin{cases} \frac{2}{21}x & 0 \leq x \leq k \\ \frac{2}{15}(6-x) & k < x \leq 6 \\ 0 & \text{otherwise} \end{cases}$$

- (a) Show that  $k = 3.5$

You must make your method clear and show all stages of your working.

(5)

- (b) Use algebraic integration to find  $E(X)$

You must show all stages of your working.

(4)

Given that  $E(X^2) = \frac{277}{24}$

- (c) find  $\text{Var}(X)$

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## Question 5 continued

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**(Total for Question 5 is 11 marks)**

6. The continuous random variable  $X$  is uniformly distributed over the interval  $[a, b]$

Given that

- $P(2 < X < 5) = \frac{3}{16}$

- $E(X) = 6$

(a) find the value of  $a$  and the value of  $b$  (3)

(b) find the value of the constant  $c$  such that  $E(cX + 1) = 3$  (2)

(c) find the exact value of  $\text{Var}(X)$  (1)

(d) find the exact value of  $E(X^2)$  (2)

(e) find  $P\left(\frac{3}{2}X - b > a\right)$  (2)

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**Question 6 continued**

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**(Total for Question 6 is 10 marks)**

7. When purchasing a pair of glasses from an optician, customers are offered insurance to cover accidental damage.

Past records from the optician show that 30% of customers buy insurance when they purchase a pair of glasses.

In a random sample of 40 customers who have purchased a pair of glasses,  $X$  represents the number who buy insurance.

- (a) State a suitable model for the distribution of  $X$  (1)

- (b) State a necessary assumption for the model in part (a) to be valid. (1)

The probability that fewer than  $r$  customers who have purchased a pair of glasses buy insurance is less than 0.05

- (c) Find the largest possible value of  $r$  (2)

A second random sample of 200 customers who have purchased a pair of glasses is taken.

Using a normal approximation, the probability that at least  $t$  of these 200 customers buy insurance is 0.9474, correct to 4 decimal places.

- (d) Find the value of  $t$   
You must show your working. (5)

The optician decided to introduce a special offer in which customers who purchase a pair of glasses get the first three months of insurance free if they buy insurance.

Following this, a random sample of 25 customers who purchase a pair of glasses is taken and 11 of them buy insurance.

- (e) Test, at the 10% level of significance, whether or not there is evidence that the proportion of customers who buy insurance when purchasing a pair of glasses has increased. State your hypotheses clearly. (5)

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**Question 7 continued**

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**(Total for Question 7 is 14 marks)****TOTAL FOR PAPER IS 75 MARKS**