

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

## Pearson Edexcel International Advanced Level

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 6 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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1. A research project into food purchases found that 35% of people who buy eggs do **not** buy free range eggs.

A random sample of 30 people who bought eggs is taken. The random variable  $F$  denotes the number of people who do **not** buy free range eggs.

- (a) Find  $P(F \geq 12)$  (2)

- (b) Find  $P(8 \leq F < 15)$  (2)

A farm shop gives 3 loyalty points with every purchase of free range eggs. With every purchase of eggs that are **not** free range the farm shop gives 1 loyalty point. A random sample of 30 customers who buy eggs from the farm shop is taken.

- (c) Find the probability that the total number of points given to these customers is less than 70 (3)

The manager of the farm shop believes that the proportion of customers who buy eggs but do **not** buy free range eggs is more than 35%

In a survey of 200 customers who buy eggs, 86 do **not** buy free range eggs.

Using a suitable test and a normal approximation,

- (d) determine, at the 5% level of significance, whether there is evidence to support the manager's belief. State your hypotheses clearly. (7)

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2. (i) The continuous random variable  $X$  is uniformly distributed over the interval  $[a, b]$

Given that  $P(8 < X < 14) = \frac{1}{5}$  and  $E(X) = 11$

(a) write down  $P(X > 14)$  (1)

(b) find  $P(6X > a + b)$  (4)

(ii) Susie makes a strip of pasta 45 cm long. She then cuts the strip of pasta, at a randomly chosen point, into two pieces. The random variable  $S$  is the length of the shortest piece of pasta.

(a) Write down the distribution of  $S$  (1)

(b) Calculate the probability that the shortest piece of pasta is less than 12 cm long. (2)

Susie makes 20 strips of pasta, all 45 cm long, and separately cuts each strip of pasta, at a randomly chosen point, into two pieces.

(c) Calculate the probability that exactly 6 of the pieces of pasta are less than 12 cm long. (3)

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6. The continuous random variable  $Y$  has probability density function  $f(y)$  given by

$$f(y) = \begin{cases} \frac{1}{14}(y + 2) & -1 < y \leq 1 \\ \frac{3}{14} & 1 < y \leq 3 \\ \frac{1}{14}(6 - y) & 3 < y \leq 5 \\ 0 & \text{otherwise} \end{cases}$$

(a) Sketch the probability density function  $f(y)$  (2)

Given that  $E(Y^2) = \frac{131}{21}$

(b) find  $\text{Var}(2Y - 3)$  (4)

The cumulative distribution function of  $Y$  is  $F(y)$

(c) Show that  $F(y) = \frac{1}{14} \left( \frac{y^2}{2} + 2y + \frac{3}{2} \right)$  for  $-1 < y \leq 1$  (2)

(d) Find  $F(y)$  for all values of  $y$  (5)

(e) Find the exact value of the 30th percentile of  $Y$  (2)

(f) Find  $P(4Y \leq 5 \mid Y \leq 3)$  (2)

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