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 20 January 2026

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. An internet service provider is going to carry out a sample survey of its customers to investigate how satisfied customers are with their download speed.

(a) For this survey

(i) suggest a suitable sampling frame,

(ii) identify the sampling units.

(2)

(b) Give one advantage of taking a sample rather than a census.

(1)

A large number of customers completed the survey and 35% said they were satisfied with their download speed.

A random sample of 50 customers who completed the survey is taken.

(c) Write down a suitable distribution to model the number of customers in this sample that were satisfied with their download speed.

(2)

Using your answer to part (c)

(d) find the probability that more than 40% of the customers in the sample were satisfied with their download speed.

(2)

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Question 1 continued

(Total for Question 1 is 7 marks)

2. A continuous random variable X has cumulative distribution function

$$F(x) = \begin{cases} 0 & x < 4 \\ k(x-4) & 4 \leqslant x \leqslant 10 \\ 1 & x > 10 \end{cases}$$

where k is a constant.

(a) Show that $k = \frac{1}{6}$

(1)

(b) Write down the value of $P(X = 5)$

(1)

(c) Find $P(5 < X < 7)$

(2)

(d) Specify the probability density function of X, for all values of x

(2)

(e) Hence sketch the probability density function of X

(2)

(f) Write down the value of $E(X)$

(1)

(g) Find $E(2X^2 - 1)$
You must make your method clear.

(3)

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Question 2 continued

Question 2 continued

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Question 2 continued

(Total for Question 2 is 12 marks)



3. Remy's house has a sensor which detects motion.

The number of times the sensor detects motion in a 15-minute period during every morning is modelled by a Poisson distribution with mean 2.5

(a) Find the probability that during a randomly selected morning the sensor detects motion

(i) at least 4 times in a randomly selected 30-minute period,

(ii) at least 4 times in each of 3 randomly selected non-overlapping 30-minute periods.

(4)

Remy decides to clean the sensor.

After cleaning the sensor, Remy records the number of times the sensor detects motion in a one-hour period in the morning.

Remy will use this data to test, at a 5% significance level, if there is evidence that the mean rate of detecting motion has increased.

(b) Write down suitable null and alternative hypotheses for Remy's test.

(1)

(c) Find the critical region for the test **and** state its associated probability.

(3)

In the one-hour period after the sensor is cleaned, the sensor detects motion 13 times.

Using this observation and your answer to part (c)

(d) state the conclusion to the test, giving a reason for your answer.

(1)

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Question 3 continued

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Question 3 continued

(Total for Question 3 is 9 marks)

4. An optician is testing patients for a specific eye condition.

It is known from past records that 5% of patients have this eye condition.

(a) Find the probability that from a random sample of 30 patients

(i) exactly one patient has the eye condition,

(ii) no more than 2 patients have the eye condition.

(2)

The optician claims that the proportion of patients with the eye condition has changed.

A random sample of 150 patients is taken and 13 have the eye condition.

(b) Using a suitable approximation, carry out an appropriate test to investigate the optician's claim. Use a 5% level of significance and state your hypotheses clearly.

(6)

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Question 4 continued

(Total for Question 4 is 8 marks)

5. Supplier *A* produces a large number of sandwiches and wraps in the ratio 3 : 2

Supplier *B* produces a large number of wraps and paninis in equal quantities.

Two products are selected at random from supplier *A* and **one** product is selected at random from supplier *B*.

(a) List all the possible combinations of the **three** products.

(2)

The selling price of each product is shown in the table below.

The selling price of a wrap is the same for supplier *A* and supplier *B*.

	Sandwich	**Wrap**	**Panini**
Price	£ 3	£ 4	£ 5

The random variable *T* represents the total price, in pounds, of the **three** selected products.

(b) List all the possible values of *T*

(2)

(c) Find the sampling distribution of *T*

(3)

(d) Find the sampling distribution of the range, *R*, of the prices of the **three** selected products.

(3)

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Question 5 continued

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Question 5 continued

(Total for Question 5 is 10 marks)

6. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

A farmer grows watermelons on a farm. The weights, in kilograms, of the watermelons are modelled by the random variable W with probability density function

$$f(w) = \begin{cases} \frac{1}{9}(6 - w)(w - 2) & 2 \leqslant w \leqslant 5 \\ 0 & \text{otherwise} \end{cases}$$

(a) Sketch the graph of $f(w)$

(2)

(b) State the mode of W

(1)

(c) Find the mean weight of these watermelons.

(4)

Given that $E(W^2) = \frac{73}{5}$

(d) find the standard deviation of the weights of these watermelons, giving the answer to 3 significant figures.

(2)

(e) Show that the median lies between $w = 3.7$ and $w = 3.8$

(5)

The farmer inspects the watermelons to check whether or not they are spoiled.

The number of spoiled watermelons found by the farmer in an area of $150\,m^2$ on the farm is modelled by a Poisson distribution with mean 5

The farmer randomly selects an area of $900\,m^2$ from the farm and counts the number of spoiled watermelons.

(f) Use a normal approximation to find the probability that the farmer finds fewer than 20 spoiled watermelons.

(5)

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Question 6 continued

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Question 6 continued

(Total for Question 6 is 19 marks)

7. A train travels daily between two cities.

The probability that the train arrives no more than 2 minutes late is 0.45

Bobby randomly selects 30 of these train journeys between the two cities. The random variable X represents the number of times the train arrives no more than 2 minutes late.

(a) Find $P(X > 16)$

(2)

Hallie takes a random sample of 180 of these train journeys between the two cities.

Using a normal approximation, the probability that more than k of these 180 train journeys arrive no more than 2 minutes late is less than 0.0427 to 4 decimal places.

(b) Using standardisation, find the smallest possible value of k
You must show all stages of your working.

(8)

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Question 7 continued

Question 7 continued

(Total for Question 7 is 10 marks)

TOTAL FOR PAPER IS 75 MARKS

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