

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International Advanced Level

Time 1 hour 30 minutes

Paper
reference

WST01/01



Mathematics

International Advanced Subsidiary/Advanced Level Statistics S1

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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B:1/1/



P 7 2 1 5 4 A 0 1 2 8



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1. The stem lengths of a sample of 120 tulips are recorded in the grouped frequency table below.

Stem length (cm)	Frequency
$40 \leq x < 42$	12
$42 \leq x < 45$	18
$45 \leq x < 50$	23
$50 \leq x < 55$	35
$55 \leq x < 58$	24
$58 \leq x < 60$	8

A histogram is drawn to represent these data.

The area of the bar representing the $40 \leq x < 42$ class is 16.5 cm^2

- (a) Calculate the exact area of the bar representing the $42 \leq x < 45$ class.

(2)

The height of the tallest bar in the histogram is 10 cm.

- (b) Find the exact height of the second tallest bar.

(3)

Q_1 for these data is 45 cm.

- (c) Use linear interpolation to find an estimate for

(i) Q_2

(ii) the interquartile range.

(4)

One measure of skewness is given by

$$\frac{Q_3 - 2Q_2 + Q_1}{Q_3 - Q_1}$$

- (d) By calculating this measure, describe the skewness of these data.

(2)



Question 1 continued



P 7 2 1 5 4 A 0 3 2 8

Question 1 continued

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Question 1 continued

(Total for Question 1 is 11 marks)



P 7 2 1 5 4 A 0 5 2 8

2. The production cost, £ c million, of a film and the total ticket sales, £ t million, earned by the film are recorded for a sample of 40 films.

Some summary statistics are given below.

$$\sum c = 1634 \quad \sum t = 1361 \quad \sum t^2 = 82873 \quad \sum ct = 83634 \quad S_{cc} = 28732.1$$

- (a) Find the exact value of S_{tt} and the exact value of S_{ct} (3)
- (b) Calculate the value of the product moment correlation coefficient for these data. (2)
- (c) Give an interpretation of your answer to part (b) (1)
- (d) Show that the equation of the linear regression line of t on c can be written as

$$t = -5.84 + 0.976c$$

where the values of the intercept and gradient are given to 3 significant figures. (3)

- (e) Find the expected total ticket sales for a film with a production cost of £90 million. (2)

Using the regression line in part (d)

- (f) find the range of values of the production cost of a film for which the total ticket sales are less than 80% of its production cost. (2)



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Question 2 continued



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Question 2 continued

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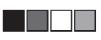
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Question 2 continued

(Total for Question 2 is 13 marks)



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3. Morgan is investigating the body length, b centimetres, of squirrels.

A random sample of 8 squirrels is taken and the data for each squirrel is coded using

$$x = \frac{b - 21}{2}$$

The results for the coded data are summarised below

$$\sum x = -1.2 \quad \sum x^2 = 5.1$$

- (a) Find the mean of b

(3)

- (b) Find the standard deviation of b

(3)

A 9th squirrel is added to the sample. Given that for all 9 squirrels $\sum x = 0$

- (c) find

- (i) the body length of the 9th squirrel,

(2)

- (ii) the standard deviation of x for all 9 squirrels.

(2)



Question 3 continued



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Question 3 continued

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Question 3 continued

(Total for Question 3 is 10 marks)



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4. The cumulative distribution function of the discrete random variable W , which takes only the values 6, 7 and 8, is given by

$$F(W) = \frac{(w+3)(w-1)}{77} \quad \text{for } w = 6, 7, 8$$

Find $E(W)$

(4)

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Question 4 continued

(Total for Question 4 is 4 marks)



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5. The weights, W grams, of kiwi fruit grown on a farm are normally distributed with mean 80 grams and standard deviation 8 grams.

The table shows the classifications of the kiwi fruit by their weight, where k is a positive constant.

Small		Large		
Tiny	Petite	Extra	Jumbo	Mega
$w < 66$	$66 \leq w < 70$	$70 \leq w < 80$	$80 \leq w < k$	$w \geq k$

One kiwi fruit is selected at random from those grown on the farm.

- (a) Find the probability that this kiwi fruit is Large.

(3)

35% of the kiwi fruit are Jumbo.

- (b) Find the value of k to one decimal place.

(4)

75% of Tiny kiwi fruit weigh more than y grams.

- (c) Find the value of y giving your answer to one decimal place.

(5)



Question 5 continued



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Question 5 continued

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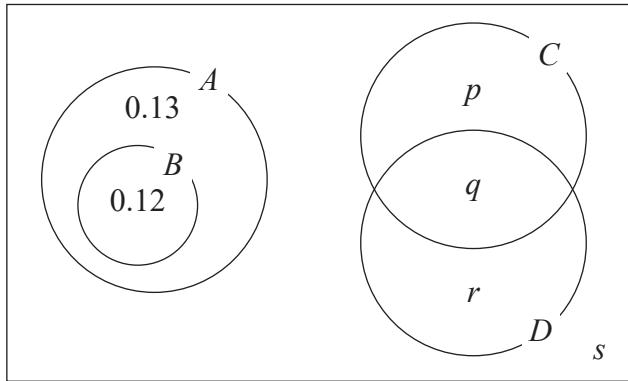
Question 5 continued

(Total for Question 5 is 12 marks)



P 7 2 1 5 4 A 0 1 9 2 8

6. The Venn diagram shows the events A , B , C and D , where p , q , r and s are probabilities.



(a) Write down the value of

- (i) $P(A)$
- (ii) $P(A|B)$
- (iii) $P(A|C)$

(3)

Given that $P(B' \cap D') = \frac{7}{10}$ and $P(C|D) = \frac{3}{5}$

(b) find the exact value of q and the exact value of r

(6)

Given also that $P(B \cup C') = \frac{5}{8}$

(c) find the exact value of s

(2)



Question 6 continued



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Question 6 continued

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Question 6 continued

(Total for Question 6 is 11 marks)



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7. Adana selects one number at random from the distribution of X which has the following probability distribution.

x	0	5	10
$P(X=x)$	0.1	0.2	0.7

- (a) Given that the number selected by Adana is not 5, write down the probability it is 0
(1)
- (b) Show that $E(X^2) = 75$
(1)
- (c) Find $\text{Var}(X)$
(3)
- (d) Find $\text{Var}(4 - 3X)$
(2)

Bruno and Charlie each independently select one number at random from the distribution of X

- (e) Find the probability that the number Bruno selects is greater than the number Charlie selects.
(3)

Devika multiplies Bruno's number by Charlie's number to obtain a product, D

- (f) Determine the probability distribution of D
(4)



Question 7 continued



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Question 7 continued

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Question 7 continued



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Question 7 continued

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(Total for Question 7 is 14 marks)

TOTAL FOR PAPER: 75 MARKS

