

Please check the examination details below before entering your candidate information

Candidate surname	Other names
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Pearson Edexcel
International
Advanced Level

Centre Number

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Candidate Number

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Monday 20 January 2020

Afternoon (Time: 1 hour 30 minutes)	Paper Reference WST01/01
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Mathematics
International Advanced Subsidiary/Advanced Level
Statistics S1

You must have:
Mathematical Formulae and Statistical Tables (Blue), calculator

Total Marks

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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.

Turn over ►

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Question 2 continued

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Q2

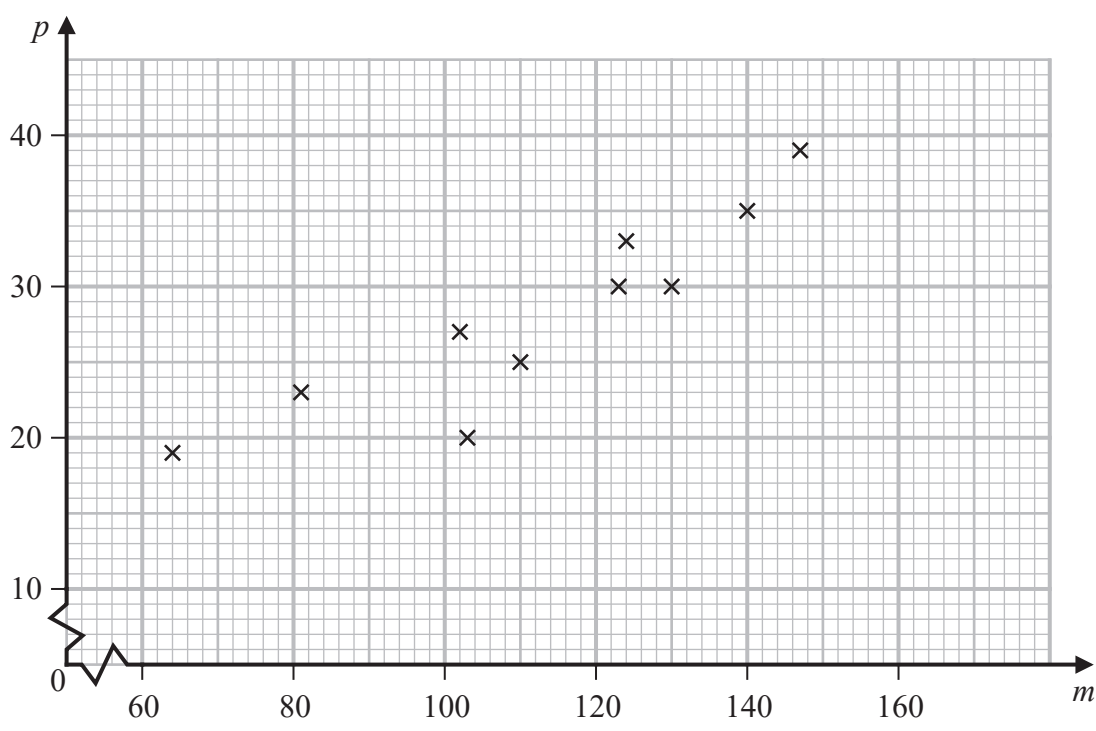
(Total 12 marks)



3. Soapern sells washing machines. When a customer buys a washing machine from Soapern, the customer is also invited to buy a guarantee policy to cover breakdowns and repairs for the next three years.

The manager of Soapern believes that the relationship between the number of washing machines sold (m) and the number of guarantee policies sold (p) can be modelled by a straight line.

She collected data each month for 10 months. The scatter diagram below illustrates these data.



The data are summarised by the following statistics.

$$\sum m = 1124 \quad \sum p = 281 \quad \sum mp = 32\,958 \quad S_{mm} = 6046.4 \quad S_{pp} = 382.9$$

- (a) Show that $S_{mp} = 1373.6$ (1)
- (b) Find the value of the product moment correlation coefficient for these data. (2)
- (c) State, giving a reason, whether or not the data are consistent with the manager's belief. (1)

The manager noticed that the total number of washing machines sold was k times the total number of guarantee policies sold and suggests a model of the form $p = \frac{1}{k}m$, where k is an integer.

- (d) Find the value of k . (2)



Question 3 continued

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Q3

(Total 13 marks)



4. A researcher is studying the birth weights of babies. A random sample of 98 babies was taken and their birth weights, w kg, are summarised in the table below.

Birth weight (w kg)	Frequency (f)	Birth weight midpoint (x)
$1.50 \leq w < 2.50$	16	2.00
$2.50 \leq w < 3.00$	24	2.75
$3.00 \leq w < 3.50$	32	3.25
$3.50 \leq w < 4.00$	14	3.75
$4.00 \leq w < 5.50$	12	4.75

(You may use $\sum fx = 311.5$ and $\sum fx^2 = 1051.125$)

A histogram is drawn to represent these data.

The bar representing the birth weight $1.50 \leq w < 2.50$ has a width of 1 cm and a height of 4 cm.

- (a) Calculate the width and height of the bar representing birth weight $3.50 \leq w < 4.00$ (3)

- (b) Use linear interpolation to estimate the lower quartile of the birth weights of the 98 babies. (2)

The researcher estimated the median to be 3.14 kg and the upper quartile to be 3.55 kg.

- (c) Use the median and quartiles to describe the skewness of these data. (2)

- (d) Find an estimate for (i) the mean birth weight
(ii) the standard deviation of the birth weights. (3)

- (e) Use the formula

$$\text{skewness} = \frac{3(\text{mean} - \text{median})}{\text{standard deviation}}$$

to estimate a value for the skewness of these data. Give your answer to 2 significant figures. (2)

The researcher read that birth weights should be approximately normally distributed and decides to split the class $3.00 \leq w < 3.50$

The frequency for $3.00 \leq w < 3.25$ is 9 and the frequency for $3.25 \leq w < 3.50$ is 23

- (f) (i) State, giving a reason, what the effect would be on the estimate of the median.
(ii) Without carrying out any further calculations state, giving a reason, what the effect of this change would be on the estimate of the mean. (2)



Question 5 continued

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Q5

(Total 14 marks)



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