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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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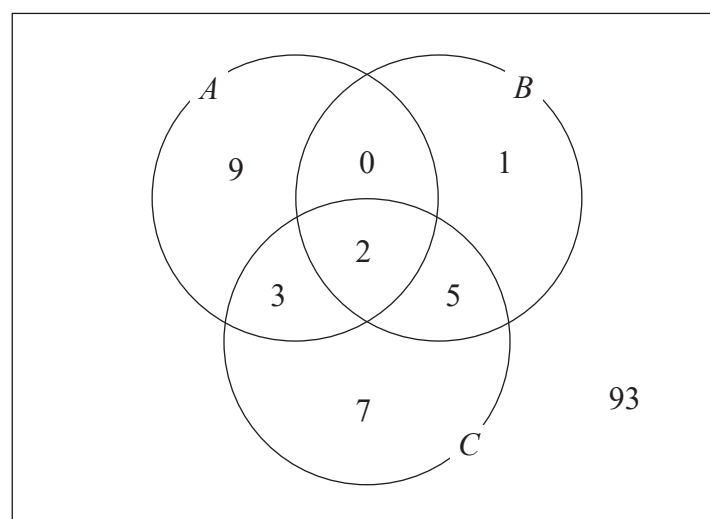
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1. A factory produces shoes.

A quality control inspector at the factory checks a sample of 120 shoes for each of three types of defect. The Venn diagram represents the inspector's results.

$A$  represents the event that a shoe has defective stitching  
 $B$  represents the event that a shoe has defective colouring  
 $C$  represents the event that a shoe has defective soles



One of the shoes in the sample is selected at random.

- Find the probability that it does **not** have defective soles. (1)
- Find  $P(A \cap B \cap C')$  (1)
- Find  $P(A \cup B \cup C')$  (2)
- Find the probability that the shoe has at most one type of defect. (2)
- Given the selected shoe has at most one type of defect, find the probability it has defective stitching. (2)

The random variable  $X$  is the number of the events  $A, B, C$  that occur for a randomly selected shoe.

- Find  $E(X)$  (3)

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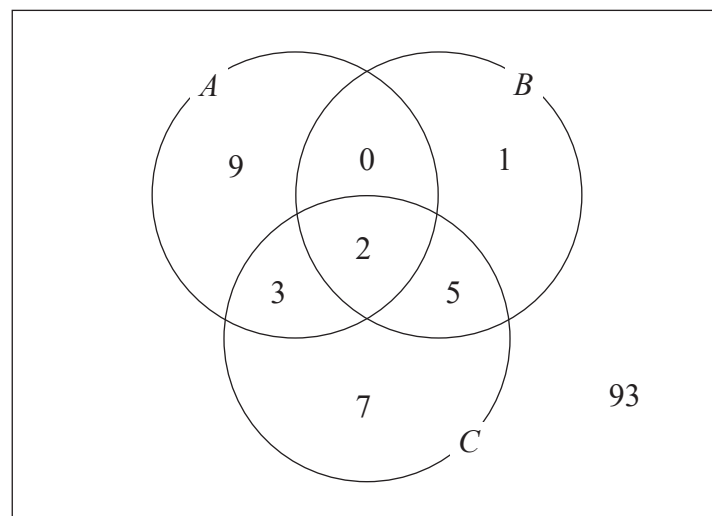
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# Question 1 continued

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This is a copy of the Venn diagram for this question.



(Total 11 marks)

Q1



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- The summary statistics for the 10 journeys are given below.

The amount of petrol remaining in the fuel tank for each journey,  $w$  litres, is recorded.

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Q2



3. The stem and leaf diagram shows the number of deliveries made by Pat each day for 24 days

Key: 10 | 8 represents 108 deliveries

|    |     |     |     |   |   |   |   |   |   |   |   |      |
|----|-----|-----|-----|---|---|---|---|---|---|---|---|------|
| 10 | 8   | 9   |     |   |   |   |   |   |   |   |   | (2)  |
| 11 | 0   | 3   | 6   | 6 | 6 | 8 | 8 | 9 | 9 | 9 | 9 | (11) |
| 12 | 4   | 5   | 5   | 5 | 5 | 5 | 5 | 8 |   |   |   | (8)  |
| 13 | $a$ | $b$ | $c$ |   |   |   |   |   |   |   |   | (3)  |

where  $a$ ,  $b$  and  $c$  are positive integers with  $a < b < c$

An outlier is defined as any value greater than  $1.5 \times$  interquartile range above the upper quartile.

Given that there is only one outlier for these data,

- (a) show that  $c = 9$

(3)

The number of deliveries made by Pat each day is represented by  $d$

The data in the stem and leaf diagram are coded using

$$x = d - 125$$

and the following summary statistics are obtained

$$\sum x = -96 \quad \text{and} \quad \sum (x - \bar{x})^2 = 1306$$

- (b) Find the mean number of deliveries.

(3)

- (c) Find the standard deviation of the number of deliveries.

(2)

One of these 24 days is selected at random. The random variable  $D$  represents the number of deliveries made by Pat on this day.

The random variable  $X = D - 125$

- (d) Find  $P(D > 118 | X < 0)$

(2)

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Q3



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4. The random variable  $W$  has a discrete uniform distribution where

$$P(W = w) = \frac{1}{5} \quad \text{for } w = 1, 2, 3, 4, 5$$

(a) Find  $P(2 \leq W < 3.5)$

(1)

The discrete random variable  $X = 5 - 2W$

(b) Find  $E(X)$

(3)

(c) Find  $P(X < W)$

(2)

The discrete random variable  $Y = \frac{1}{W}$

(d) Find

(i) the probability distribution of  $Y$

(ii)  $\text{Var}(Y)$ , showing your working.

(5)

(e) Find  $\text{Var}(2 - 3Y)$

(2)

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Q4



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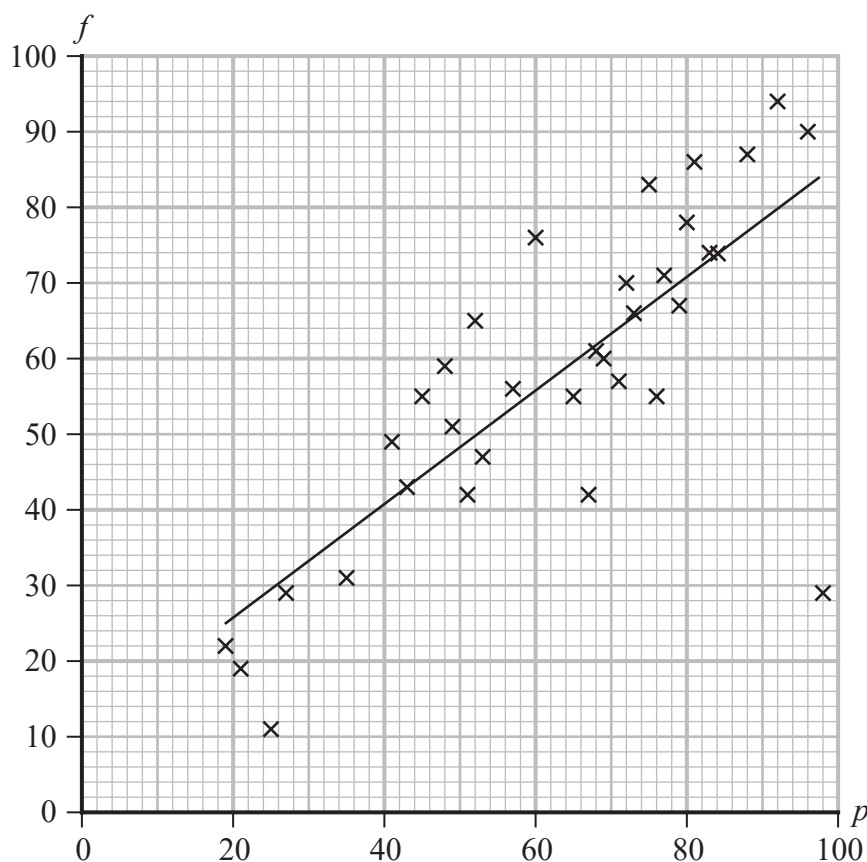
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Q5



6. Students on a psychology course were given a pre-test at the start of the course and a final exam at the end of the course. The teacher recorded the number of marks achieved on the pre-test,  $p$ , and the number of marks achieved on the final exam,  $f$ , for 34 students and displayed them on the scatter diagram.



The equation of the least squares regression line for these data is found to be

$$f = 10.8 + 0.748p$$

For these students, the mean number of marks on the pre-test is 62.4

- (a) Use the regression model to find the mean number of marks on the final exam. (2)
- (b) Give an interpretation of the gradient of the regression line. (1)
- Considering the equation of the regression line, Priya says that she would expect someone who scored 0 marks on the pre-test to score 10.8 marks on the final exam.
- (c) Comment on the reliability of Priya's statement. (1)
- (d) Write down the number of marks achieved on the final exam for the student who exceeded the expectation of the regression model by the largest number of marks. (1)

Question 6 continues on page 24.



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Question 6 continues on page 24.



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- (3)

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$$n = 34 \quad \sum p = 2120 \quad \sum pf = 133486 \quad S_{pp} = 15573.76 \quad S_{pf} = 11648.35$$

- (5)

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Q6



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- The cumulative distribution function of  $X$  is given by

(c) find the exact value of  $a$  and the exact value of  $b$

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Q7

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END

TOTAL FOR PAPER: 75 MARKS

