

**Solomon Press**  
**Statistics S1**  
**Paper B**  
**(Question paper)**

**All exam papers are issued free to students for education purpose only.  
Mr.S.V.Swarnaraja (Marking Examiner, Team Leader & Author)  
www.swanash.com, Mobile: +94777304755 , email: swa@swanash.com**

# GCE Examinations

## Statistics

### Module S1

Advanced Subsidiary / Advanced Level

Paper B

Time: 1 hour 30 minutes

#### *Instructions and Information*

---

Candidates may use any calculator except those with a facility for symbolic algebra and/or calculus.

Full marks may be obtained for answers to ALL questions.

Mathematical and statistical formulae and tables are available.

This paper has 7 questions.

#### *Advice to Candidates*

---

You must show sufficient working to make your methods clear to an examiner. Answers without working will gain no credit.



*Written by Shaun Armstrong & Chris Huffer*

© *Solomon Press*

*These sheets may be copied for use solely by the purchaser's institute.*

1. An adult evening class has 14 students. The ages of these students have a mean of 31.2 years and a standard deviation of 7.4 years.

A new student who is exactly 42 years old joins the class. Calculate the mean and standard deviation of the 15 students now in the group.

**(7 marks)**

---

2. A tennis coach believes that taller players are generally capable of hitting faster serves. To investigate this hypothesis he collects data on the 20 adult male players he coaches.

The height,  $h$ , in metres and the speed of each player's fastest serve,  $v$ , in miles per hour were recorded and summarised as follows:

$$\Sigma h = 36.22, \quad \Sigma v = 2275, \quad \Sigma h^2 = 65.7396, \quad \Sigma v^2 = 259853, \quad \Sigma hv = 4128.03.$$

- (a) Calculate the product moment correlation coefficient for these data. **(5 marks)**
- (b) Comment on the coach's hypothesis. **(2 marks)**
- 

3. The events  $A$  and  $B$  are such that

$$P(A) = 0.2 \quad \text{and} \quad P(A \cup B) = 0.6$$

Find

- (a)  $P(A' \cap B')$ , **(2 marks)**
- (b)  $P(A' \cap B)$ . **(2 marks)**

Given also that events  $A$  and  $B$  are independent, find

- (c)  $P(B)$ , **(4 marks)**
- (d)  $P(A' \cup B')$ . **(2 marks)**
-

4. The discrete random variable  $X$  has the following probability distribution.

$x$	1	2	3	4	5
$P(X=x)$	0.1	0.35	$k$	0.15	$k$

Calculate

- (a)  $k$ , **(2 marks)**
- (b)  $F(2)$ , **(1 mark)**
- (c)  $P(1.3 < X \leq 3.8)$ , **(2 marks)**
- (d)  $E(X)$ , **(2 marks)**
- (e)  $\text{Var}(3X + 2)$ . **(5 marks)**

5. For a project, a student asked 40 people to draw two straight lines with what they thought was an angle of  $75^\circ$  between them, using just a ruler and a pencil. She then measured the size of the angles that had been drawn and her data are summarised in this stem and leaf diagram.

Angle	(6   4 means $64^\circ$ )	Totals
4	1	(1)
4		(0)
5	0 2 4	(3)
5	5 8 9	(3)
6	1 1 3 3 4	(5)
6	5 5 7 8 9	(5)
7	0 1 1 2 3 3 4 4 4	(9)
7	5 6 6 7 7 9 9	(7)
8	0 1 1 3 4	(5)
8	5 6	(2)

- (a) Find the median and quartiles of these data. **(4 marks)**

Given that any values outside of the limits  $Q_1 - 1.5(Q_3 - Q_1)$  and  $Q_3 + 1.5(Q_3 - Q_1)$  are to be regarded as outliers,

- (b) determine if there are any outliers in these data, **(3 marks)**
- (c) draw a box plot representing these data on graph paper, **(3 marks)**
- (d) describe the skewness of the distribution and suggest a reason for it. **(2 marks)**

*Turn over*

6. The individual letters of the word STATISTICAL are written on 11 cards which are then shuffled.

One card is selected at random. Find the probability that it is

- (a) a vowel, **(1 mark)**  
(b) a T, given that it is a consonant. **(2 marks)**

The 11 cards are then shuffled again and the top three are turned over. Find the probability that

- (c) all three of the cards have a T on them, **(3 marks)**  
(d) at least two of the cards show a vowel. **(6 marks)**
- 

7. The volume of liquid in bottles of sparkling water from one producer is believed to be normally distributed with a mean of 704 ml and a variance of  $3.2 \text{ ml}^2$ .

Calculate the probability that a randomly chosen bottle from this producer contains

- (a) more than 706 ml, **(3 marks)**  
(b) between 703 and 708 ml. **(4 marks)**

The bottles are labelled as containing 700 ml.

- (c) In a delivery of 1 200 bottles, how many could be expected to contain less than the stated 700 ml? **(4 marks)**

The bottling process can be adjusted so that the mean changes but the variance is unchanged.

- (d) What should the mean be changed to in order to have only a 0.1% chance of a bottle having less than 700 ml of sparkling water? Give your answer correct to 1 decimal place. **(4 marks)**
- 

**END**