

**Solomon Press**  
**Statistics S1**  
**Paper F**  
**(Mark Scheme)**

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GCE Examinations  
Advanced Subsidiary / Advanced Level

**Statistics**  
**Module S1**

Paper F

**MARKING GUIDE**

This guide is intended to be as helpful as possible to teachers by providing concise solutions and indicating how marks should be awarded. There are obviously alternative methods that would also gain full marks.

Method marks (M) are awarded for knowing and using a method.

Accuracy marks (A) can only be awarded when a correct method has been used.

(B) marks are independent of method marks.



*Written by Shaun Armstrong & Chris Huffer*

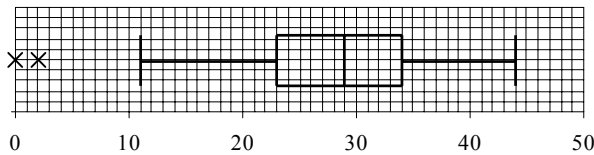
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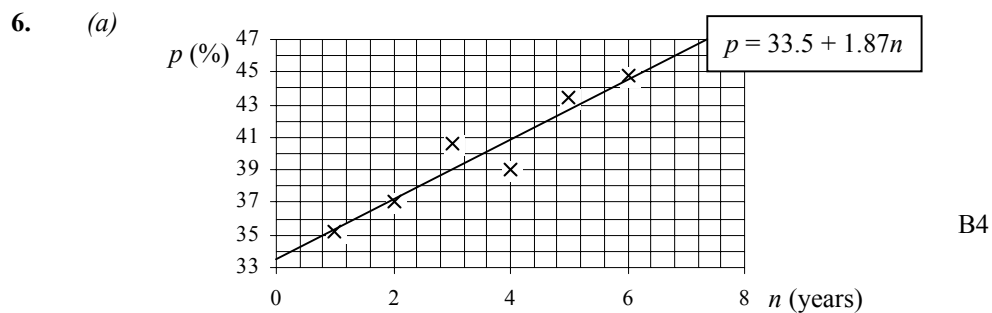
## S1 Paper F – Marking Guide

1.	(a)	$\text{mean} = \frac{1145.3}{15} = 76.4 \text{ kg}$ $\text{variance} = \frac{88042.14}{15} - 76.353^2 = 39.6 \text{ kg}^2$	M1 A1	
	(b)	mean lower as replacement weighs less variance higher as replacement's weight further from mean	B2 B2	(9)
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2.	(a)	$a + b + \frac{1}{4} + 2a + \frac{1}{8} = 1$ $3a + b = \frac{5}{8}; b = \frac{5}{8} - 3a$	M1 M1 A1	
	(b)	$\sum xP(x) = a + 2b + \frac{3}{4} + 8a + \frac{5}{8}$ $= 9a + 2\left(\frac{5}{8} - 3a\right) + \frac{11}{8} = 3a + \frac{21}{8}$	M1 M1 A1	
	(c)	$3a + \frac{21}{8} = \frac{45}{16}$ $3a = \frac{45}{16} - \frac{21}{8} = \frac{3}{16}$ $a = \frac{1}{16}, b = \frac{7}{16}$	M1 M1 A2	(10)
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3.	(a)	$P(Z < \frac{25-21.5}{2.2}) = P(Z < 1.59) = 0.9441$	M2 A1	
	(b)	$P(Z > \frac{19-21.5}{2.2}) = P(Z > -1.14) = 0.8729 \therefore 87.3\%$	M2 A1	
	(c)	$P(Z < \frac{20-21.5}{2.2}) = P(Z < -0.68) = 0.2483$ $P(2 \text{ of } 3 < 20) = 3 \times 0.2483^2 \times 0.7517 = 0.139$	M1 A1 M2 A1	(11)
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4.	(a)	$0.76 = 0.5 + 0.42 - P(A \cap B)$ $P(A \cap B) = 0.92 - 0.76 = 0.16$	M1 M1 A1	
	(b)	$(1 - 0.5) + 0.16 = 0.66$	M2 A1	
	(c)	$= \frac{P(B \cap A')}{P(A')} = \frac{0.42 - 0.16}{1 - 0.5} = 0.52$	M2 A1	
	(d)	$P(A) \times P(B) = 0.5 \times 0.42 = 0.21$ $\neq P(A \cap B) \therefore \text{not independent}$	M1 A1 A1	(12)
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5. (a)  $n = 31$ , median = 29  
 $Q_1 = 23$   
 $Q_3 = 34$   
 $IQR = Q_3 - Q_1 = 34 - 23 = 11$  A1  
A1  
A1  
M1 A1
- (b)  $Q_2 - Q_1 = 6$ ;  $Q_3 - Q_2 = 5$   
 $\therefore Q_2 - Q_1 > Q_3 - Q_2 \therefore$  slight +ve skew M1  
M1 A1
- (c) e.g. recommend mean and std. dev. as they take account of all values and there is little skew / few extreme values B2
- (d)  $Q_1 - 2s = 2.4$ ;  $Q_3 + 2s = 54.6 \therefore$  outliers are 0, 2 M1 A1



B4 (16)



B4

- (b)  $S_{np} = 873 - \frac{21 \times 240.1}{6} = 32.65$  M1  
 $S_{nn} = 91 - \frac{21^2}{6} = 17.5$  M1  
 $b = \frac{32.65}{17.5} = 1.8657$  M1 A1  
 $a = \frac{240.1}{6} - 1.8657 \times \frac{21}{6} = 33.4867$  M1 A1  
 $p = 33.5 + 1.87n$  A1  
line on graph above B2

- (c)  $S_{pp} = 9675.41 - \frac{240.1^2}{6} = 67.4083$  M1  
 $r = \frac{32.65}{\sqrt{17.5 \times 67.4083}} = 0.9506$  M1 A1  
 $r$  strongly +ve supporting linear model B1 (17)

Total (75)