

Solomon Press
Statistics S1
Paper E
(Mark Scheme)

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GCE Examinations
Advanced Subsidiary / Advanced Level
Statistics
Module S1

Paper E

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.



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S1 Paper E – Marking Guide

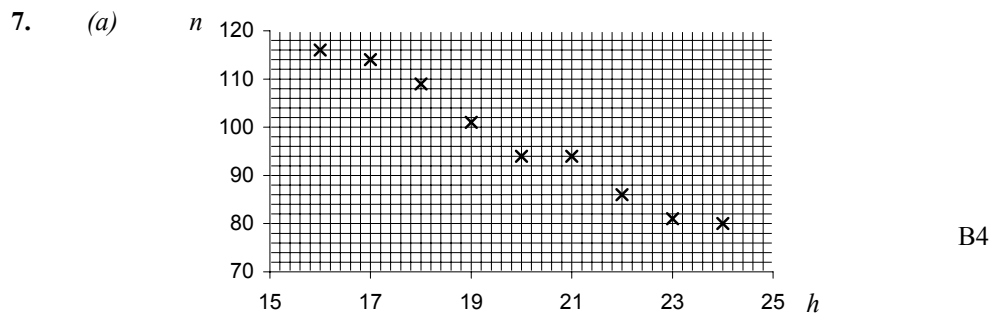
1. (a)

	Studio	Live	Total	
Jazz	(13)	3	(16)	
Blues	9	5	14	
Total	22	(8)	(30)	A2
- (b) $\frac{5}{30} = \frac{1}{6}$ A1
- (c) $\frac{13}{22}$ M1 A1 (5)
-
2. (a) Discrete Uniform B1
- (b) $R = 10Q + 4$ A2
- (c) $E(R) = (10 \times 3) + 4 = 34$ M1 A1
 $\text{Var}(R) = 10^2 \times 2 = 200$ M1 A1 (7)
-
3. (a) $P(Z < \frac{45-42}{\sqrt{18}}) = P(Z < 0.71) = 0.7611$ M2 A1
- (b) $P(\frac{32-42}{\sqrt{18}} < Z < \frac{38-42}{\sqrt{18}}) = P(-2.36 < Z < -0.94)$ M2
 $= P(Z < -0.94) - P(Z < -2.36) = 0.1736 - 0.0091 = 0.1645$ M1 A1
- (c) $P(Z < \frac{x-42}{\sqrt{18}}) = 0.95; \frac{x-42}{\sqrt{18}} = 1.6449$ M1 A1
 $x = 42 + (1.6449 \times \sqrt{18}) = 49.0$ M1 A1 (11)
-
4. (a) cum. freqs: 36, 128, 202, 241, 255, 282, 300 B1
median = $150^{\text{th}} = 40 + 20(\frac{22}{74}) = 45.9$ [$150.5^{\text{th}} \rightarrow 46.1$] M1 A1
- (b) middle 80% = P_{10} to P_{90} B1
 $P_{10} = 30^{\text{th}} = 20(\frac{30}{36}) = 16.7$ [$30.1^{\text{th}} \rightarrow 16.7$] M1
 $P_{90} = 270^{\text{th}} = 200 + 100(\frac{15}{27}) = 255.6$ [$270.9^{\text{th}} \rightarrow 258.9$] M1
 \therefore limits are 17 and 256 years A2
- (c) e.g. data v. skewed, some extremely high values B2
doesn't affect median but increases mean significantly B1
median better, most values below the mean (11)
-
5. (a)

y	0	1	2	3	4
P(Y=y)	0.05	0.1	0.2	0.4	0.25

 M1 A1
- (b) $0.1 + 0.2 = 0.3$ M1 A1
- (c) $\sum yP(y) = 0 + 0.1 + 0.4 + 1.2 + 1 = 2.7$ M1 A1
- (d) $(2 \times 2.7) + 4 = 9.4$ M1 A1
- (e) $E(Y^2) = \sum y^2P(y) = 0 + 0.1 + 0.8 + 3.6 + 4 = 8.5$ M1 A1
 $\text{Var}(Y) = 8.5 - (2.7)^2 = 1.21$ M1 A1 (12)
-

6. (a) $0.45 \times 0.6 = 0.27$ M1 A1
- (b) $1 - (0.45 \times 0.4 \times 0.6) = 1 - 0.108 = 0.892$ M2 A1
- (c) $P(\text{passed 1st time} \mid \text{passed}) = \frac{P(\text{passed 1st time} \cap \text{passed})}{P(\text{passed})}$ M2
 $= \frac{0.55}{0.892} = 0.617$ (3sf) A1
- (d) 200 1st time, 120 2nd time, 80 3rd time A1
no. expected to pass = $(200 \times 0.55) + (120 \times 0.6) + (80 \times 0.4)$ M2
 $= 110 + 72 + 32 = 214$ A1 (12)



- (b) $S_{hm} = 17204 - \frac{180 \times 875}{9} = -296$ M1
 $S_{hh} = 3660 - \frac{180^2}{9} = 60$ M1
 $b = \frac{-296}{60} = -4.9333$ M1 A1
 $a = \frac{875}{9} - [-4.9333 \times \frac{180}{9}] = 195.888$ M1 A1
 $h = 195.9 - 4.93h$ A1
- (c) no. of clinches decreases by 4.93 per hour awake B1
- (d) e.g. ability likely to be roughly constant during normal waking hours
only decreases when awake for longer than usual B2
- (e) $195.9 - 4.93h = 213.4 - 5.87h$ M1
 $0.94h = 17.5; h = 18.6$ hours M1 A1 (17)

Total (75)