GCE Examinations

Advanced Subsidiary / Advanced Level

Statistics

Module S1

Paper C

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 C – Marking Guide

1. *(a)* e.g. using a distribution or other simplified way of representing a real situation that allows predictions to be made about it — B2

(b) Normal — B1

(c) e.g. most values close to mean; roughly symmetrical — B2

(d) e.g. male and female mean weights may differ giving bimodal dist^{n} — B1 **(6)**

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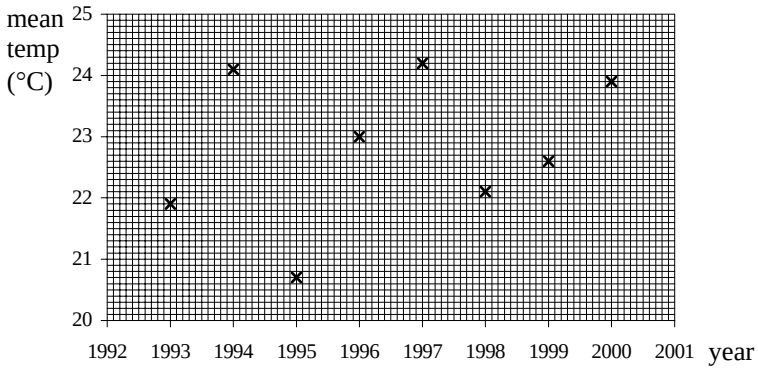
2. *(a)*



B3

(b) $S_{YY} = 140 - \frac{28^2}{8} = 42$ — M1

$S_{TT} = 4173.93 - \frac{182.5^2}{8} = 10.64875$ — M1

$S_{YT} = 644.7 - \frac{28 \times 182.5}{8} = 5.95$ — M1

$r = \frac{5.95}{\sqrt{42 \times 10.64875}} = 0.2813$ — M1 A1

(b) 8 pairs ∴ + 0.2813 is only weak evidence of June getting warmer — B1 **(9)**

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3. *(a)* $\frac{57-16}{120} = \frac{41}{120}$ — M1 A1

(b) $\frac{85}{120} = \mathrm{P}(C) + \frac{57}{120} - \frac{16}{120}$ — M2

$\mathrm{P}(C) = \frac{85-57+16}{120} = \frac{44}{120} = \frac{11}{30}$ — M1 A1

(c) $\mathrm{P}(C' \mid D') = \frac{\mathrm{P}(C' \cap D')}{\mathrm{P}(D')}$ — M2

$= \frac{\frac{35}{120}}{1-\frac{57}{120}} = \frac{35}{63} = \frac{5}{9}$ — M1 A1 **(10)**

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4. *(a)* $b = \frac{594.05}{85.44} = 6.953$ — M1

$a = 104.4 - (6.953 \times 4.92) = 70.192$ — M1

$c = 70.2 + 6.95v$ — M1 A1

(b) a = no. of sign-ups without an advert — B1

b = no. of extra sign-ups per million viewers of advert — B1

(c) $70.192 + (6.953 \times 3.7) = 95.92$ ∴ 96 — M1 A1

(d) e.g. type of programme; length of advert — B2 **(10)**

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5. *(a)* $P(Z < \frac{28-25}{\sqrt{16}}) = P(Z < 0.75) = 0.7734$ M2 A1

(b) $P(^-5 < T - 25 < 5) = P(\frac{20-25}{4} < Z < \frac{30-25}{4})$ M2

$= P(^-1.25 < Z < 1.25) = 0.8944 - 0.1056 = 0.7888$ M1 A1

(c) $P(T < 23) = P(Z < 0.5) = 0.6915$ M1 A1

$P(\text{3bikes, each} < 23 \text{ mins}) = (0.6915)^3 = 0.3307$ M1 A1 **(11)**

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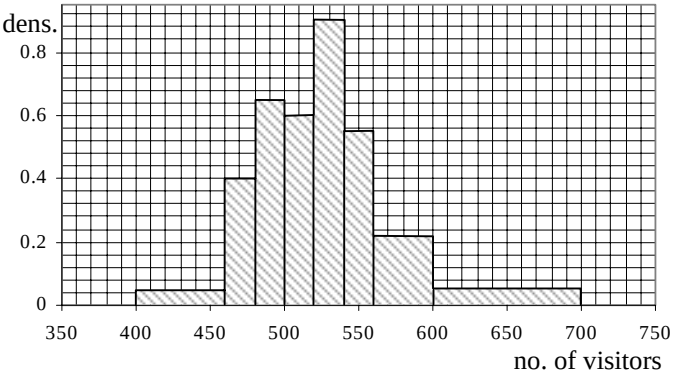
6. *(a)* freq. dens. = 0.05, 0.4, 0.65, 0.6, 0.9, 0.55, 0.225, 0.05 M1 A1



B2

(b) y values = $^-8, ^-4, ^-2, 0, 2, 4, 7, 14$ M1

$\sum fy = (^-8 \times 3) + (^-4 \times 8) + ... = 131$ M1 A1

(c) $\sum f = 79$; $\bar{y} = \frac{131}{79} = 1.658$ M1

$\bar{x} = (10 \times 1.658) + 509.5 = 526.1$ M1 A1

std. dev. of $y = \sqrt{\frac{2041}{79} - 1.658^2} = 4.805$ M1

std. dev. of $x = 10 \times 4.805 = 48.0$ M1 A1 **(13)**

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7. *(a)* $\frac{4}{6} \times \frac{2}{5} = \frac{4}{15}$ M1 A1

(b) same method, giving

b	1	2	3	4	5
$P(B = b)$	$\frac{1}{3}$	$\frac{4}{15}$	$\frac{1}{5}$	$\frac{2}{15}$	$\frac{1}{15}$

M2 A2

(c) $\sum bP(b) = \frac{1}{15}(5 + 8 + 9 + 8 + 5) = \frac{35}{15} = \frac{7}{3}$ M2 A1

(d) $P(\text{winning}) = \frac{1}{3} + \frac{4}{15} = \frac{3}{5}$ M1 A1

expected winnings $= \frac{3}{5} \times 50 = 30$ pence M1 A1

(e) $(3 \times 30) - 100 = ^-10$ $\therefore$ 10 pence loss M2 A1 **(16)**

Total **(75)**

Performance Record – S1 Paper C

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	Total
Topic(s)	modelling	scatter diagram, pmcc	probability	regression	normal dist.	histogram, coding	probability, discrete r. v.	
Marks	6	9	10	10	11	13	16	75
Student								