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.

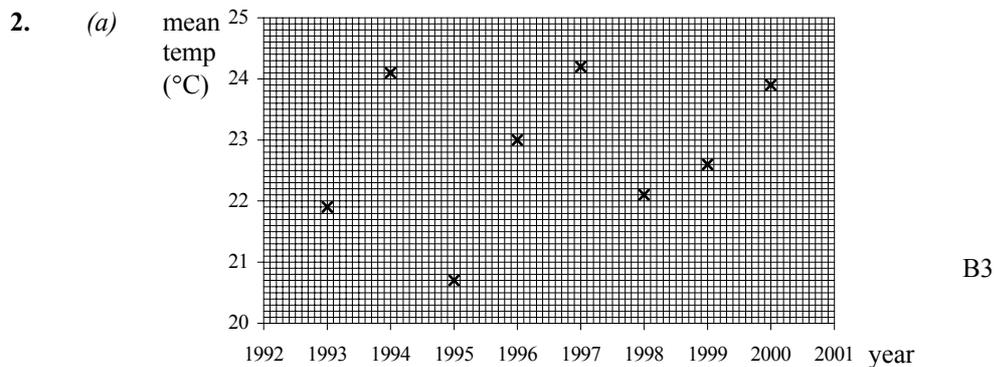(B) marks are independent of method marks.

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

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

    (c) $P(C' \,|\, D') = \frac{P(C' \cap D')}{P(D')}$ 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) $70.192 + (6.953 \times 3.7) = 95.92 \ \therefore \ 96$ 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(3bikes, each < 23 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
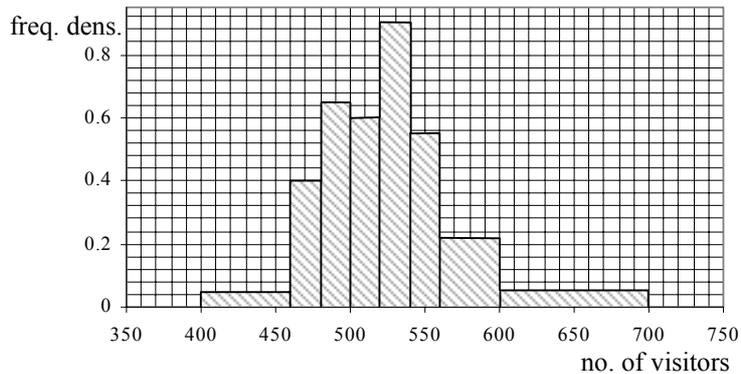
(b) y values = $^-8$, $^-4$, $^-2$, 0, 2, 4, 7, 14   M1

$\sum fy = (^-8 \times 3) + (^-4 \times 8) + \ldots = 131$ 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) $\sum b P(b) = \frac{1}{15}(5 + 8 + 9 + 8 + 5) = \frac{35}{15} = \frac{7}{3}$ M2 A1

(d) P(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)**

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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								