

Solomon Press
Core Mathematics C2
Paper G
(Mark Scheme)

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GCE Examinations
Advanced Subsidiary

Core Mathematics C2

Paper G

MARKING GUIDE

This guide is intended to be as helpful as possible to teachers by providing concise solutions and indicating how marks could 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

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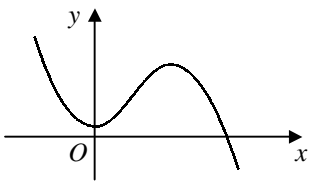
C2 Paper G – Marking Guide

1.	$= \int_{-2}^0 (9x^2 - 6x + 1) dx$ $= [3x^3 - 3x^2 + x]_{-2}^0$ $= (0) - (-24 - 12 - 2) = 38$	M1 M1 A1 M1 A1	(5)
<hr/>			
2.	<p>(a) $f(-1) = 0 \therefore -1 - k - 20 = 0$ $k = -21$</p> <p>(b)</p> $ \begin{array}{r} x^2 - x - 20 \\ x + 1 \overline{) x^3 + 0x^2 - 21x - 20} \\ \underline{x^3 + x^2} \\ -x^2 - 21x \\ \underline{-x^2 - x} \\ -20x - 20 \\ \underline{-20x - 20} \\ 0 \end{array} $ <p>$(x + 1)(x^2 - x - 20) = 0$ $(x + 1)(x + 4)(x - 5) = 0$ $x = -4, -1, 5$</p>	M1 A1 M1 A1	(6)
<hr/>			
3.	<p>(a) $5 \cos \theta = 2 \sin \theta$ $\frac{5}{2} = \frac{\sin \theta}{\cos \theta}$ $\tan \theta = 2.5$</p> <p>(b) $\tan 2x = 2.5$ $2x = 68.199, 180 + 68.199$ $2x = 68.199, 248.199$ $x = 34.1, 124.1$ (1dp)</p>	M1 A1 B1 M1 M1 A1	(6)
<hr/>			
4.	<p>(a) $(x - 2) \lg 3 = \lg 5$ $x = \frac{\lg 5}{\lg 3} + 2 = 3.46$ (3sf)</p> <p>(b) $\log_2 (6 - y) + \log_2 y = 3$ $\log_2 [y(6 - y)] = 3$ $y(6 - y) = 2^3 = 8$ $y^2 - 6y + 8 = 0$ $(y - 2)(y - 4) = 0$ $y = 2, 4$</p>	M1 M1 A1 M1 M1 M1 A1	(7)
<hr/>			
5.	<p>(a) $r = \frac{27}{36} = \frac{3}{4}$</p> <p>(b) $= 27 \times \frac{3}{4} = 20\frac{1}{4}$</p> <p>(c) $a \times (\frac{3}{4})^2 = 36$ $a = 36 \times \frac{16}{9} = 64$ $S_{\infty} = \frac{64}{1 - \frac{3}{4}} = 256$</p>	M1 A1 M1 A1 M1 A1 M1 A1	(8)

6. (a)

x	2	3	4	5	6
y	2.89	6.36	11.55	18.50	27.27

 B2
- (b) area $\approx \frac{1}{2} \times 1 \times [2.89 + 27.27 + 2(6.36 + 11.55 + 18.50)]$ B1 M1 A1
 $= 51.5$ (3sf) A1
- (c) over-estimate B1
the curve passes below the top edge of each trapezium B1 (8)

7. (a) $f'(x) = 12x - 3x^2$ M1 A1
for SP, $12x - 3x^2 = 0$
 $3x(4 - x) = 0$ M1
 $x = 0, 4$
 $\therefore (0, 2), (4, 34)$ A2
- (b) $f''(x) = 12 - 6x$ M1
 $f''(0) = 12, f''(x) > 0 \therefore (0, 2)$ minimum A1
 $f''(4) = -12, f''(x) < 0 \therefore (4, 34)$ maximum A1
- (c)  B2
- (d) $2 < k < 34$ B1 (11)

8. (a) $= \frac{-8-4}{8-2} = -2$ M1 A1
- (b) $= (\frac{2+8}{2}, \frac{4-8}{2}) = (5, -2)$ M1 A1
- (c) perp. grad $= \frac{-1}{-2} = \frac{1}{2}$ M1
perp. bisector: $y + 2 = \frac{1}{2}(x - 5)$ M1 A1
centre where $y = 0 \therefore x = 9 \Rightarrow (9, 0)$ M1 A1
- (d) radius = dist. $(2, 4)$ to $(9, 0) = \sqrt{49+16} = \sqrt{65}$ B1
 $\therefore (x - 9)^2 + (y - 0)^2 = (\sqrt{65})^2$ M1
 $x^2 - 18x + 81 + y^2 = 65$
 $x^2 + y^2 - 18x + 16 = 0$ A1 (12)

9. (a) $\frac{\sin B}{3} = \frac{\sin 2.2}{7}$ M1
 $\sin B = \frac{3}{7} \sin 2.2$
 $\angle ABC = 0.354$ (3sf) M1 A1
- (b) $\angle BAC = \pi - (2.2 + 0.3538) = 0.588$ (3sf) M1 A1
- (c) $= \frac{1}{2} \times 3 \times 7 \times \sin 0.5878 = 5.82 \text{ m}^2$ (3sf) M1 A1
- (d) $= 5.822 + [\frac{1}{2} \times 2^2 \times (2\pi - 0.5878)] + [\frac{1}{2} \times 1^2 \times (2\pi - 0.3538)]$ M3 A1
 $= 20.2 \text{ m}^2$ (3sf) A1 (12)

Total (75)