

FOR OCR

GCE Examinations  
Advanced / Advanced Subsidiary

## **Core Mathematics C2**

Paper K

### 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 using a valid 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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## C2 Paper K – Marking Guide

1.	$\log_5 \frac{4x+3}{x-1} = 2$ $\frac{4x+3}{x-1} = 5^2 = 25$ $4x+3 = 25(x-1)$ $21x = 28$ $x = \frac{4}{3}$	M1 M1 M1 A1	(4)
2.	$(1-x)^6 = 1 + 6(-x) + \binom{6}{2}(-x)^2 + \dots = 1 - 6x + 15x^2$ $(1+x)(1-x)^6 = (1+x)(1 - 6x + 15x^2 + \dots)$ $\text{coeff. of } x^2 = 15 - 6 = 9$	M1 A2 M1 A1	(5)
3.	<p>(i) AP: <math>a = 77, l = -70</math>  <math>S_{50} = \frac{50}{2} [77 + (-70)] = 25 \times 7 = 175</math></p> <p>(ii) AP: <math>a = 2, d = \frac{1}{2}</math>  <math>S_n = \frac{n}{2} [4 + \frac{1}{2}(n-1)]</math>  <math>= \frac{1}{4} n [8 + (n-1)] = \frac{1}{4} n(n+7) \quad [k = \frac{1}{4}]</math></p>	B1 M1 A1 B2 M1 A1	(7)
4.	<p>(i) <math>\cos^2 P = 1 - (\frac{2}{3})^2 = \frac{5}{9}</math>  acute <math>\therefore \cos \angle QPR = \sqrt{\frac{5}{9}} = \frac{1}{3}\sqrt{5}</math></p> <p>(ii) <math>QR^2 = 7^2 + (3\sqrt{5})^2 - (2 \times 7 \times 3\sqrt{5} \times \frac{1}{3}\sqrt{5})</math>  <math>QR^2 = 49 + 45 - 70 = 24</math>  <math>QR = \sqrt{24} = \sqrt{4 \times 6} = 2\sqrt{6}</math></p> <p>(iii) <math>\frac{\sin Q}{3\sqrt{5}} = \frac{\frac{2}{3}}{2\sqrt{6}}</math>  <math>\sin Q = \frac{\sqrt{5}}{\sqrt{6}}</math>  <math>\angle PQR = 65.9^\circ \text{ (1dp)}</math></p>	M1 A1 M1 M1 A1 M1 A1	(7)
5.	<p>(i) <math>= 4x^2 + x^{-2} + c</math></p> <p>(ii) <math>(1, 1) \therefore 1 = 4 + 1 + c</math>  <math>c = -4</math>  <math>y = 4x^2 + x^{-2} - 4</math>  <math>y = (2x - \frac{1}{x})^2 \quad [a = 2, b = -1]</math></p>	M1 A2 M1 A1 M1 A1	(7)

6.	(i)	$-27 + 63 - 3p - 6 = 0$ $p = 10$	M1 A1
	(ii)	remainder = $f(2) = 8 + 28 + 20 - 6 = 50$	M1 A1
	(iii)	$x = -3$ is a solution $\therefore (x + 3)$ is a factor	B1
		$  \begin{array}{r}  x^2 + 4x - 2 \\  x + 3 \overline{) x^3 + 7x^2 + 10x - 6} \\  \underline{x^3 + 3x^2} \phantom{+ 10x - 6} \\  4x^2 + 10x \phantom{- 6} \\  \underline{4x^2 + 12x} \phantom{- 6} \\  - 2x - 6 \\  \underline{- 2x - 6} \\  0  \end{array}  $	M1 A1
		$\therefore (x + 3)(x^2 + 4x - 2) = 0$ $x = -3$ or $x^2 + 4x - 2 = 0$ other solutions: $x = \frac{-4 \pm \sqrt{16 + 8}}{2} = -4.45, 0.45$	M1 A1 (9)
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7.	(i)	$r = \frac{\log_3 16}{\log_3 4} = \frac{\log_3 4^2}{\log_3 4} = \frac{2 \log_3 4}{\log_3 4} = 2$	M2 A1
	(ii)	$ar = \log_3 4$ $a = \frac{\log_3 4}{2} = \frac{\log_3 2^2}{2} = \frac{2 \log_3 2}{2} = \log_3 2$	M1 A1
	(iii)	$S_6 = \frac{(2^6 - 1) \log_3 2}{2 - 1} = 63 \log_3 2$ let $y = \log_3 2 \therefore 3^y = 2$ $y = \frac{\lg 2}{\lg 3}$	M1 A1 M1 A1
		$\therefore S_6 = 63 \times \frac{\lg 2}{\lg 3} = 39.7$ (3sf)	A1 (10)
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8.	(i)	$2x = 1.2490, \pi + 1.2490 = 1.2490, 4.3906$ $x = 0.62, 2.20$ (2dp)	B1 M1 M1 A1
	(ii)	$2 \sin y \cos y = \sin y$ $\sin y (2 \cos y - 1) = 0$ $\sin y = 0$ or $\cos y = \frac{1}{2}$ $y = 0, \pi$ or $\frac{\pi}{3}, 2\pi - \frac{\pi}{3}$ $y = 0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}$	M1 M1 A1 B2 M1 A1
			(11)
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9.	(i)	$x = 4 \therefore y = 12 - 8 + 2 = 6$ $\frac{dy}{dx} = 3 - 2x^{-\frac{1}{2}}$ grad = $3 - 1 = 2$ $\therefore y - 6 = 2(x - 4)$ $y - 6 = 2x - 8$ $y = 2x - 2$	B1 M1 A1 M1 M1 A1
	(ii)	area = $\int_0^4 [(3x - 4\sqrt{x} + 2) - (2x - 2)] dx$ $= \int_0^4 (x - 4\sqrt{x} + 4) dx$ $= [\frac{1}{2}x^2 - \frac{8}{3}x^{\frac{3}{2}} + 4x]_0^4$ $= (8 - \frac{64}{3} + 16) - (0) = \frac{8}{3}$	M1 M1 A2 M1 A1
			(12)

Total (72)

## Performance Record – C2 Paper K

Question no.	1	2	3	4	5	6	7	8	9	Total
Topic(s)	logs	binomial	AP	cosine rule, sine rule	integr.	remain. theorem, alg. div.	GP, logs	trig. eqn	area by integr.	
Marks	4	5	7	7	7	9	10	11	12	72
Student										