

Solomon Press
Core Mathematics C1
Paper K
(Mark Scheme)

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GCE Examinations
Advanced Subsidiary

Core Mathematics C1

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 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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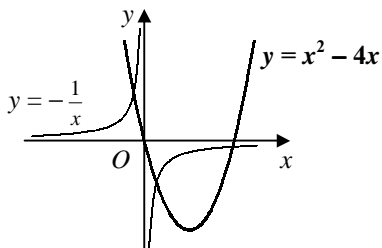
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C1 Paper K – Marking Guide

<p>1. $(2^2)^{y+3} = 2^3$ $2y + 6 = 3$ $y = -\frac{3}{2}$</p>	<p>M1 M1 A1</p>	<p>(3)</p>
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<p>2. $= \int (3x^2 + \frac{1}{2}x^{-2}) dx$ $= x^3 - \frac{1}{2}x^{-1} + c$</p>	<p>B1 M1 A2</p>	<p>(4)</p>
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<p>3. $\frac{EH}{AD} = \frac{EF}{AB} \therefore \frac{EH}{\sqrt{5}} = \frac{1+\sqrt{5}}{3-\sqrt{5}}$ $\frac{1+\sqrt{5}}{3-\sqrt{5}} = \frac{1+\sqrt{5}}{3-\sqrt{5}} \times \frac{3+\sqrt{5}}{3+\sqrt{5}} = \frac{3+\sqrt{5}+3\sqrt{5}+5}{9-5} = 2 + \sqrt{5}$ $\therefore EH = \sqrt{5}(2 + \sqrt{5}) = 5 + 2\sqrt{5}$</p>	<p>M1 M2 A1 M1 A1</p>	<p>(6)</p>
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<p>4. (a) </p>	<p>B2 B2</p>	
<p>(b) 3 solutions $x^2 - 4x + \frac{1}{x} = 0 \Rightarrow x^2 - 4x = -\frac{1}{x}$ and the graphs of $y = x^2 - 4x$ and $y = -\frac{1}{x}$ intersect at 3 points</p>	<p>B1 B1</p>	<p>(6)</p>

<p>5. (a) $(x+k)^2 - k^2 + 4 = 0$ $(x+k)^2 = k^2 - 4$ $x+k = \pm\sqrt{k^2-4}$ $x = -k \pm \sqrt{k^2-4}$</p>	<p>M1 A1 M1 A1</p>	
<p>(b) $k = 3 \therefore x = -3 \pm \sqrt{3^2-4}$ $= -3 \pm \sqrt{5}$</p>	<p>M1 A1</p>	<p>(6)</p>

<p>6. (a) AP: $a = 77, l = -70$ $S_{50} = \frac{50}{2}[77 + (-70)] = 25 \times 7 = 175$</p>	<p>B1 M1 A1</p>	
<p>(b) AP: $a = 2, d = \frac{1}{2}$ $S_n = \frac{n}{2}[4 + \frac{1}{2}(n-1)]$ $= \frac{1}{4}n[8 + (n-1)] = \frac{1}{4}n(n+7) \quad [k = \frac{1}{4}]$</p>	<p>B2 M1 A1</p>	<p>(7)</p>

<p>7. $x - 3y + 7 = 0 \Rightarrow x = 3y - 7$ sub. into $x^2 + 2xy - y^2 = 7$ $(3y-7)^2 + 2y(3y-7) - y^2 = 7$ $y^2 - 4y + 3 = 0$ $(y-1)(y-3) = 0$ $y = 1, 3$ $\therefore x = -4, y = 1$ or $x = 2, y = 3$</p>	<p>M1 M1 A1 M1 A1 M1 A1</p>	<p>(7)</p>
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8.	(a)	$\frac{dy}{dx} = 1 - 4x^{-3}$	B1
		$\frac{d^2y}{dx^2} = 12x^{-4}$	M1 A1
	(b)	$y = \int (1 - 4x^{-3}) dx$	
		$y = x + 2x^{-2} + c$	M1 A2
		$x = -1, y = 0 \therefore 0 = -1 + 2 + c$	
		$c = -1$	M1
		$y = x + 2x^{-2} - 1$	
		when $x = 2, y = 2 + \frac{1}{2} - 1 = \frac{3}{2}$	M1 A1 (9)

9.	(a)	$y = x - 6\sqrt{x} + 9$	M1 A1
		$\frac{dy}{dx} = 1 - 3x^{-\frac{1}{2}} = 1 - \frac{3}{\sqrt{x}}$	M1 A1
	(b)	$x = 4 \therefore y = 1$	
		grad of tangent $= 1 - \frac{3}{2} = -\frac{1}{2}$	M1
		grad of normal $= \frac{-1}{-\frac{1}{2}} = 2$	M1 A1
		$\therefore y - 1 = 2(x - 4)$	M1
		$y = 2x - 7$	A1
	(c)	at intersect: $x - 6\sqrt{x} + 9 = 2x - 7$	
		$x + 6\sqrt{x} - 16 = 0$	M1
		$(\sqrt{x} + 8)(\sqrt{x} - 2) = 0$	M1
		$\sqrt{x} = -8, 2$	A1
		$\sqrt{x} = 2 \Rightarrow x = 4$ (at P)	
		$\sqrt{x} = -8 \Rightarrow$ no real solutions \therefore normal does not intersect again	A1 (13)

10.	(a)	$y - 4 = 3(x + 6)$	M1
		$y = 3x + 22$	A1
	(b)	at B, $x = 0 \therefore y = 2 \Rightarrow B(0, 2)$	B1
		at C, $x - 7(3x + 22) + 14 = 0$	M1
		$x = -7$	A1
		$\therefore C(-7, 1)$	A1
	(c)	grad AB $= \frac{2-4}{0-(-6)} = -\frac{1}{3}$	M1 A1
		grad AC $= \frac{1-4}{-7-(-6)} = 3$	
		grad AB \times grad AC $= -\frac{1}{3} \times 3 = -1$	M1
		$\therefore AB$ perp to $AC \therefore \angle BAC = 90^\circ$	A1
	(d)	$AB = \sqrt{(0+6)^2 + (2-4)^2} = \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$	M1 A1
		$AC = \sqrt{(-7+6)^2 + (1-4)^2} = \sqrt{1+9} = \sqrt{10}$	
		area $= \frac{1}{2} \times 2\sqrt{10} \times \sqrt{10} = 10$	M1 A1 (14)

Total (75)