

NOVEMBER 2002

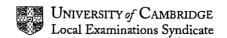
GCE Advanced Subsidiary Level

MARK SCHEME

MAXIMUM MARK: 50

SYLLABUS/COMPONENT:9709/2

MATHEMATICS (Pure 2)



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1	EITHER:	State or imply non-modular inequality $(2x-1)^2 < (3x)^2$, or corresponding equation	B1	0
		Expand and make reasonable solution attempt at $2/\sqrt{3}$ 3-term quadratic, or equivalent Obtain critical values -1 and $\frac{1}{5}$	M1 A1	٥
			A1	
	OR:	State correct answer $x < -1$, $x > \frac{1}{5}$ State $\log c$ correct equation for a critical value e.g. $2x - 1 = 3x$	M1	0
	OA.	State two relevant equations separately e.g. $2x - 1 = 3x$ and $2x - 1 = -3x$	A1	. •
		Obtain critical values -1 and $\frac{1}{5}$	A1	
		State correct answer $x < -1$, $x > \frac{1}{5}$	A1	
	OR:	State one critical value (probably $x = -1$), from a graphical method or by inspection or by		
•		solving a linear inequality	B1 B2	
		State the other critical value correctly State correct answer $x < -1$, $x > \frac{1}{5}$	B1	4
		[The answer $\frac{1}{5} < x < -1$ scores B0.]		•
* -		[The answer $\frac{1}{5}$ \sim 1 Secret Ber]		
2	State or o	obtain $-2 + a + b = 0$, or equivalent	B1	
4		be $x = -2$ and equate to -5	Ml	
	Obtain 3-	term equation, or equivalent	A1	
		elevant pair of equations, obtaining a or b oth answers $a = 3$ and $b = -1$	M1 A1	5
3		or imply that $9^x = y^2$	B1	1
		out recognisable solution method for quadratic in y in $y = \frac{1}{2}$ and $y = 3$ from $2y^2 - 7y + 3 = 0$	M1 A1	
,		og method to solve an equation of the form $3^x = k$	M1	
		in answer $x = -\frac{\ln 2}{\ln 3}$, or exact equivalent $\{1, \lambda y\}$	A1"	()
		exact answer $x = 1$ (no penalty if logs used)	B1	5
	State	exact answer x = 1 (no penalty it logs used)	DI	
4	(i) Make	recognisable sketches over the given range of a suitable pair of graphs e.g. $y = \sin x$ and $y = \frac{1}{x^2}$	Bl	
		or imply connection between intersections and roots and justify given statement	B1	2
		solution values (or signs) of $\sin x - \frac{1}{x^2}$ at $x = 1$ and $x = 1.5$	Mi	
		/e given result correctly	A1	2
		range $\sin x = \frac{1}{x^2}$ and obtain given answer	B1	1
		*	D1	
		he iterative formula correctly with $1 \le x_n \le 1.5$ in final answer 1.07	M1 A1	
		v sufficient iterations to justify its accuracy to 3d.p., or show there is a sign change in the	ΛI	
		val (1.065, 1.075)	, A1	3

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7			ign error]			
,	Jse sin 30° = cos 60° = $\frac{1}{2}$ and sin 60° = cos 30° = $\frac{\sqrt{3}}{2}$				M1(dep	*)
(Collect terms and obtain given answer correctly	•			A 1	3
(ii) (Carry out correct processes to evaluate a single trig ratio		.		Ml	
(Obtain answer 73.9°				A1	
(Obtain second answer 253.9° and no others				Al 🖍	3
(iii) S	State or imply that $\cos^2 x = \frac{1}{13}$ or $\sin^2 x = \frac{12}{13}$			2	Bl	
	Jse a relevant trig formula to evaluate cos 2x				Ml	
. (Obtain exact answer $-\frac{11}{13}$ correctly				Al	3
[Use of only say $\cos x = +\frac{1}{\sqrt{13}}$, probably from a right tri	angle, can earn B1M1A0.]			

6 (a) Obtain indefinite integral $-\frac{1}{2}\cos 2x + \sin x$	***		B1+B1	
Use limits with attempted integral			Ml	
Obtain answer 2 correctly with no errors	•	2	Al	4
(b) (i) Identify R with correct definite integral and attempt to integrate			M1	
Obtain indefinite integral $\ln(x+1)$			Bl	
Obtain answer $R = \ln (p+1) - \ln 2$			Al	3
(ii) Use exponential method to solve an equation of the form $\ln x = k$	•		Ml	
Obtain answer $p = 13.8$			Al	2

7	(i)	State $6y \frac{dy}{dx}$ as the derivative of $3y^2$	Bl	
		State $\pm 2x \frac{dy}{dx} \pm 2y$ as the derivative of $-2xy$ (allow any combination of signs here)	B1 '	
		Equate attempted derivative of LHS to 0 (or 10) and solve for $\frac{dy}{dx}$	Ml	
		Obtain the given answer correctly [The M1 is dependent on at least one of the B marks being earned.]	A 1	4
	(ii)	State or imply the points lie on $y-2x=0$ $cx/(y-3x)/(3y-3x)=0$ Carry out complete method for finding one coordinate of a point of intersection of $y=kx$ with the	BI	②
		given curve	Ml	
		Obtain $10x^2 = 10$ or $2\frac{1}{2}y^2 = 10$ or 2-term equivalent	ΑI	
		Obtain one correct point e.g. $(1,2)$ r	Al Al	⊘ 5 ⊙
			/\	