

JUNE 2002

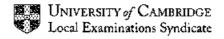
GCE Advanced Subsidiary Level

MARK SCHEME

MAXIMUM MARK: 50

SYLLABUS/COMPONENT:9709/2

MATHEMATICS (Pure 2)





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				_
	FITHER:	State or imply non-modular inequality $(x+2)^2 < (5-2x)^2$, or corresponding equation	В1	
	21111210	Expand and make reasonable solution attempt at 2- or 3-term quadratic, or equivalent	Ml	
		Obtain critical values 1 and 7	Al	
		State correct answer $x < 1, x > 7$	ΑI	
	OR:	State one correct equation for a critical value e.g. $x + 2 = 5 - 2x$	M1	
		State two relevant equations separately e.g. $x + 2 = 5 - 2x$ and $x + 2 = -(5 - 2x)$	Αī	
		Obtain critical values 1 and 7 State correct answer $x < 1$, $x > 7$		
	QR:	State one critical value (probably $x = 1$), from a graphical method or by inspection or by	Al	
		solving a linear inequality	B1	
		State the other critical value correctly	B2	
		State correct answer $x < 1, x > 7$	Bl	4
		[The answer $7 \le x \le 1$ scores B0.]		
	(i) EITH	ER: Substitute –2 for x and equate to zero	Ml	
		Obtain answer $a = 7$	Al ·	
	OR:	Carry out complete division and equate remainder to zero	Ml	
		Obtain answer $a = 7$	A1	2
	(ii) EITHI	ER: Find quadratic factor by division or inspection	M1	
		Obtain answer $3x^2 + x - 4$	A1	
		Factorise completely to $(x+2)(x-1)(3x+4)$	A1	
		[To earn the M1 the quotient (or factor) must contain $3x^2$ and another term, at least.]		
	OR:	State $(x-1)$ is a factor	B1	
		Find remaining linear factor by division or by inspection	Ml	
		Factorise completely to $(x + 2)(x - 1)(3x + 4)$	Al	3
		imply the relation $\ln y = \ln A + n \ln x$	B1	_
		imply $\ln A = 2.3$	B1.∕	
		nswer $A = 9.97$	B1	
		e gradient of the given line	Mi	
	Obtain a	nswer $n = -0.15$	Al	5
-	(i) State	answer $R = \sqrt{13}$		_
			Вl	
		rig formula to find α	Ml	
		in answer $\alpha = 33.7^{\circ}$	Αl	
	(ii) Carry	yout, or indicate need for, evaluation of $\cos^{-1}(3.5/\sqrt{13})$ ($\approx 13.9^{\circ}$)	M1	
	Obta	in answer 47.6°	Al	
		y out correct method for second answer	M1	
		in second answer 19.8°	Al 🖍	
		coordinates (33.7, $\sqrt{13}$), or equivalent	•	
	(m) State	coordinates (55.7, \$15.), or equivalent	B1.✓	



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Page 2	Mark Scheme	Syllabus	Paper
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(i)	Obtain a derivative of the form $k e^{-x} + lx e^{-x}$ where $kl \neq 0$ Obtain correct derivative $2 e^{-x} - 2x e^{-x}$, or equivalent	B1 B1	
	Equate $\frac{dy}{dx}$ to zero and solve for x	M1	
Giî	Obtain coordinates (1, 2e ⁻¹) for P State that $\frac{1}{2} = 2x e^{-x}$ and deduce the given answer correctly	AI Bl	
	State or imply that $x_i = 0.25$ Continue the iteration correctly Obtain final answer 0.36 after sufficient iterations to justify its accuracy to 2d.p., or after showing there	Bl Ml	
	is a sign change in (0.355, 0.365)	Al	_
(a) (i) State indefinite integral $k \sin 2x$ and use limits	M1	
	Obtain given answer correctly (ii) Use double-angle formula to convert integrand to the form $a + b \cos 2x$, where $ab \neq 0$ Integrate and use limits (both terms) Obtain answer $\frac{1}{8}(\pi - 2)$, or equivalent	A! Ml* Ml(dep)*
(b	(i) Show or imply correct ordinates 1, 1.08239, $\sqrt{2}$ (1.41421) Use correct formula, or equivalent, with $h = \pi/8$ and three ordinates Obtain correct answer 0.90 with no errors seen	BI MI Al	
	 (ii) Make a correct relevant sketch of y = sec x State that the rule gives an over-estimate 	Bl* Bl(dep	*)
(i	State $\frac{dx}{dt} = 1 + \frac{2}{t}$, $\frac{dy}{dt} = 2 - \frac{1}{t}$	Bl	
	Use $\frac{dy}{dx} = \frac{dy}{dt} \div \frac{dx}{dt}$	Mi	
	Obtain $\frac{dy}{dx}$ in any correct form e.g. $\frac{2t-1}{t+2}$	Al	
(ii)	Substitute $t = 1$ in $\frac{dy}{dx}$ and both parametric equations	MI	
	Obtain $\frac{dy}{dx} = \frac{1}{3}$ and coordinates (1,2)	Al 🖍	
GH	Obtain equation $3y = x + 5$, or any 3-term equivalent	Al 🖍	
ζıπ	Equate $\frac{dy}{dx}$ to zero and solve for t Obtain answer $t = \frac{1}{2}$	M1 A1	
	Octuin 111,000 4 - 2	A.	

