CAMBRIDGE
INTERNATIONAL EXAMINATIONS

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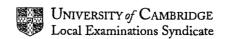
GCE Advanced Subsidiary Level

MARK SCHEME

MAXIMUM MARK: 50

SYLLABUS/COMPONENT:9709/2

MATHEMATICS (Pure 2)



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EITHER: State or imply non-modular inequality $(2x-1)^2 < (3x)^2$, or corresponding equation Expand and make reasonable solution attempt at $2/\sqrt{x}$ 3-term quadratic, or equivalent 1 Obtain critical values -1 and $\frac{1}{5}$ A1 State correct answer x < -1, $x > \frac{1}{5}$ Αl State one correct equation for a critical value e.g. 2x - 1 = 3xM1 OR: State two relevant equations separately e.g. 2x - 1 = 3x and 2x - 1 = -3xA1 Obtain critical values -1 and $\frac{1}{5}$ **A**1 State correct answer x < -1, $x > \frac{1}{5}$ Αl State one critical value (probably x = -1), from a graphical method or by inspection or by OR: Bl solving a linear inequality State the other critical value correctly B₂ B1 State correct answer x < -1, $x > \frac{1}{6}$ [The answer $\frac{1}{5} < x < -1$ scores B0.] **B**1 State or obtain -2 + a + b = 0, or equivalent M1 Substitute x = -2 and equate to -5Obtain 3-term equation, or equivalent A1 Solve a relevant pair of equations, obtaining a or b M₁ Obtain both answers a = 3 and b = -1A1 5 (i) State or imply that $9^x = y^2$ 3 **B**1 1 (ii) Carry out recognisable solution method for quadratic in y M1 Obtain $y = \frac{1}{2}$ and y = 3 from $2y^2 - 7y + 3 = 0$ Αl Use log method to solve an equation of the form $3^x = k$ M₁ Obtain answer $x = -\frac{\ln 2}{\ln 3}$, or exact equivalent $\{ t_0 \text{ ANY base } \}$ Al[°] State exact answer x = 1 (no penalty if logs used) **B**1 5 (i) Make recognisable sketches over the given range of a suitable pair of graphs e.g. $y = \sin x$ and $y = \frac{1}{x^2}$ **B**1 State or imply connection between intersections and roots and justify given statement **B**1 2 (ii) Calculate values (or signs) of $\sin x - \frac{1}{x^2}$ at x = 1 and x = 1.5Mi Derive given result correctly A1 2 (iii) Rearrange $\sin x = \frac{1}{r^2}$ and obtain given answer **B**1 1 (iv) Use the iterative formula correctly with $1 \le x_n \le 1.5$ M1 Obtain final answer 1.07 A1 Show sufficient iterations to justify its accuracy to 3d.p., or show there is a sign change in the 3 interval (1.065, 1.075) Αl

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Cambridge.com { dlow one sign error] (i) Use relevant formulae for $\cos (x - 30^\circ)$ and $\sin (x - 60^\circ)$ Ml* 5 Use $\sin 30^\circ = \cos 60^\circ = \frac{1}{2}$ and $\sin 60^\circ = \cos 30^\circ = \frac{\sqrt{3}}{2}$ M1(dep*) Collect terms and obtain given answer correctly Αl 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 3 A1/ (iii) State or imply that $\cos^2 x = \frac{1}{13}$ or $\sin^2 x = \frac{12}{13}$ Вl Use a relevant trig formula to evaluate $\cos 2x$ MI Obtain exact answer $-\frac{11}{13}$ correctly Αl 3 [Use of only say $\cos x = +\frac{1}{\sqrt{13}}$, probably from a right triangle, can earn B1M1A0.]

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6 (a)	Obtain indefinite integral $-\frac{1}{2}\cos 2x + \sin x$		B 1	+ B1	
	Use limits with attempted integral			M1	
	Obtain answer 2 correctly with no errors		*	Al	4
(b)	(i) Identify R with correct definite integral and attempt to integrate			M1	
	Obtain indefinite integral $\ln (x + 1)$			Bl	
	Obtain answer $R = \ln (p+1) - \ln 2$			'A1	3
	(ii) Use exponential method to solve an equation of the form $\ln x = k$	•		Ml	
•	Obtain answer $p = 13.8$			Al	2

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7	(i) S	tate $6y \frac{dy}{dx}$ as the derivative of $3y^2$	Bl	
	S	State $\pm 2x \frac{dy}{dx} \pm 2y$ as the derivative of $-2xy$ (allow any combination of signs here)	B1 ·	
	E	Equate attempted derivative of LHS to 0 (or 10) and solve for $\frac{dy}{dx}$	Ml	
	C	Obtain the given answer correctly	A 1 .	4
	(ii) S	The M1 is dependent on at least one of the B marks being earned.] State or imply the points lie on $y-2x=0$ $(y-3x)(3y-3x)=0$ Carry out complete method for finding one coordinate of a point of intersection of $y=kx$ with the	Bl	①
		given curve	Ml	
		Obtain $10x^2 = 10$ or $2\frac{1}{2}y^2 = 10$ or 2-term equivalent	ΑI	
	C	Dobtain one correct point e.g. (1,2) or a values of or (or y)	ΑI	0
	C	Obtain a second correct point e.g. (-1, -2)	AI AT	50