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Mark Scheme (Results)
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GCE O Level

O Level Pure Mathematics (7362_02)

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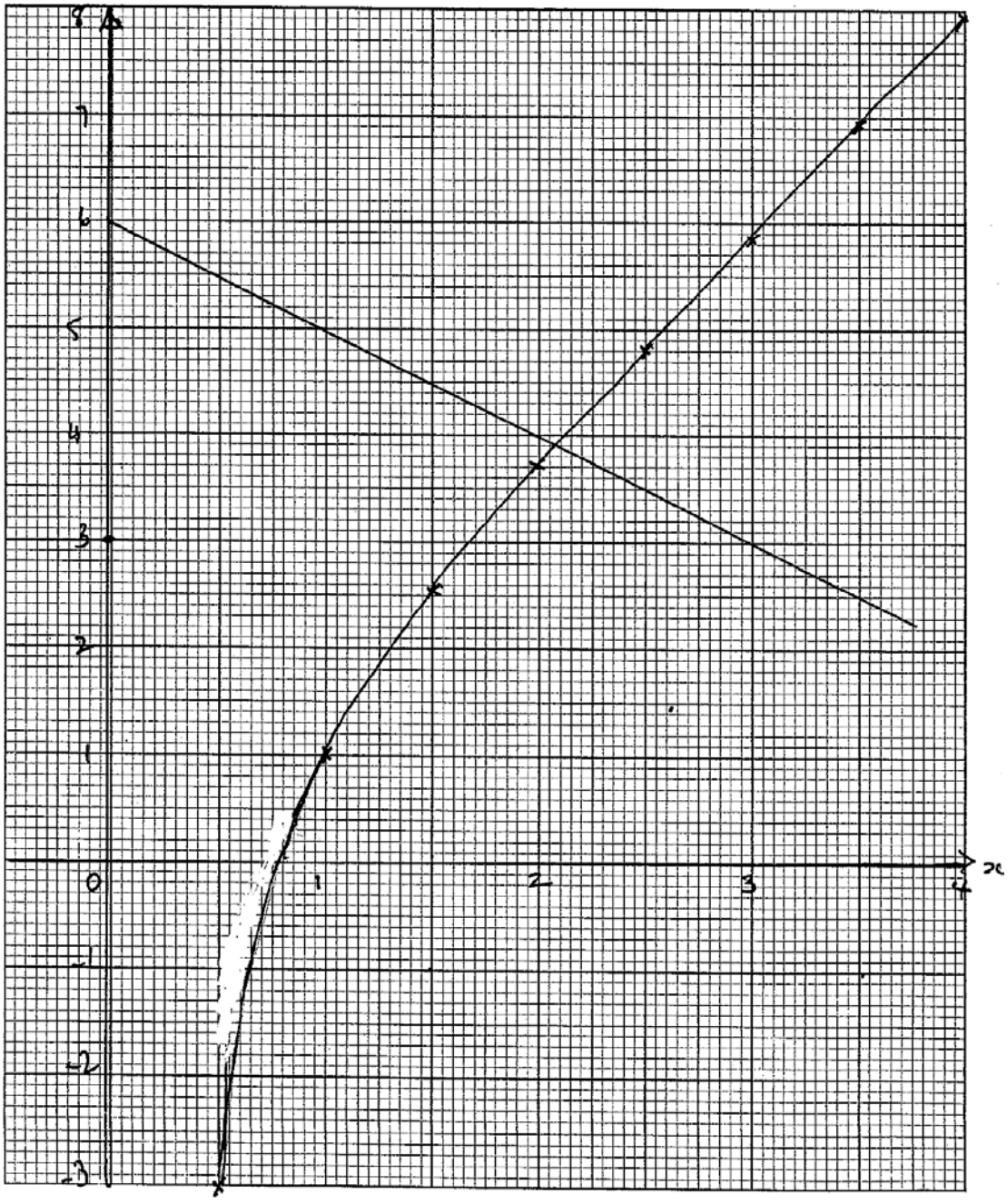
Pure Mathematics, 7362

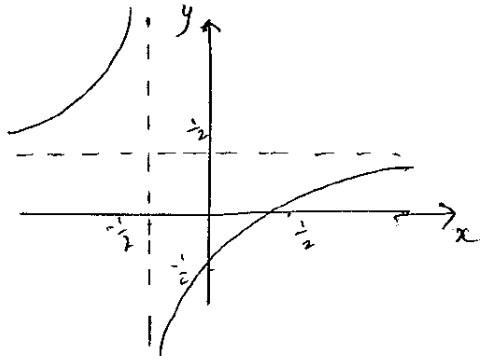
Paper 2

1	$V=\int_0^2 \pi y^2 \mathrm{d}x=\int_0^2 \pi\left(\mathrm{e}^{2x}+4\right)^2 \mathrm{d}x=\int_0^2 \pi\left(\mathrm{e}^{4x}+8\mathrm{e}^{2x}+16\right)\mathrm{d}x$ $=\pi\left[\frac{1}{4}\mathrm{e}^{4x}+4\mathrm{e}^{2x}+16x\right]_0^2$ $=\pi\left[\frac{1}{4}\mathrm{e}^{8}+4\mathrm{e}^{4}+32-\left(\frac{1}{4}+4\right)\right]=\pi\left[\frac{1}{4}\mathrm{e}^{8}+4\mathrm{e}^{4}+27\frac{3}{4}\right]$	M1 M1A1 M1A1 (5)
2	(a) $\overrightarrow{OR}=8\mathbf{i}-\mathbf{j}$ (b) $\overrightarrow{SR}=\overrightarrow{OR}-\overrightarrow{OS}=8\mathbf{i}-\mathbf{j}-\frac{1}{2}(6\mathbf{i}-5\mathbf{j})=5\mathbf{i}+\frac{3}{2}\mathbf{j}=\frac{1}{2}\overrightarrow{OQ}$ $\therefore SR \parallel OQ$	M1,A1 M1A1 A1 (5)
3	$\frac{\mathrm{d}V}{\mathrm{d}t}=45$ $h=3r \quad V=\frac{1}{3}\pi r^2 h=\pi r^3, \quad \frac{\mathrm{d}V}{\mathrm{d}r}=3\pi r^2$ $\frac{\mathrm{d}r}{\mathrm{d}t}=\frac{\mathrm{d}r}{\mathrm{d}V}\times\frac{\mathrm{d}V}{\mathrm{d}t}=\frac{1}{3\pi r^2}\times 45$ $r=4\text{cm} \quad \frac{\mathrm{d}r}{\mathrm{d}t}=\frac{15}{16\pi}=0.2984...=0.298$ cm/s	B1, M1 M1A1 M1A1(6)
4	(a) $\frac{\mathrm{d}}{\mathrm{d}\theta}\left(\frac{\sin\theta}{\cos\theta}\right)=\frac{\cos\theta\cos\theta-\sin\theta(-\sin\theta)}{\cos^2\theta}=\frac{\cos^2\theta+\sin^2\theta}{\cos^2\theta}=\frac{1}{\cos^2\theta}$ (b) $\frac{\sin\theta}{\cos\theta}=\frac{7}{5} \quad \tan\theta=1.4 \quad \theta=54.5°,\ 234.5°$	M1M1A1 M1A1A1 (6)
5	(a) $a+3d=4(a+7d), \quad 3a+25d=0$ $2(2a+3d)=164, \quad 2a+3d=82$ $6a+50d=0$ $6a+9d=246 \quad 41d=-246 \quad d=-6$ (b) $3a=-25d \quad a=\frac{25\times 6}{3}=50$ (c) $\frac{n}{2}(100+(n-1)\times(-6))>0$ $n(106-6n)>0$ crit. values $n=0 \quad n=17\frac{2}{3}$, greatest value = 17	M1, A1, M1A1, M1A1 M1 M1A1,B1√ (10)
6	(a) x: 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 y: −3 | **1** | 2.56 | **3.75** | 4.84 | **5.89** | **6.92** | 7.94 (b) Graph (c) $y=\frac{2x^3-1}{x^2}, \quad y=0, \quad x=0.79(37)$ (d) $x+3-\frac{1}{x^2}=0 \quad 2x-\frac{1}{x^2}=-x+6$ draw $y=-x+6, \quad x=2.1$	B2,1,0 G2,1,0 M1A1,A1 M1 M1A1 (10)

Examining body	Jan 2008.	7362 Pure Maths		Centre number					
Candidate name	Paper 2	q 6		Candidate number					
Paper reference				Question number		Sheet number			



7	(a) $AC^2 = 16+4 = 20 \quad BC^2 = 4+36 = 40 \quad AB^2 = 16+4 = 20$ $AC = AB = \sqrt{20} \quad BC = \sqrt{40}$ (b) $AC^2 + AB^2 = BC^2 \quad \therefore$ right angled at A $\angle A = 90° \quad AC = AB \quad \therefore \angle B = \angle C = 45°$ (c) mid-point of $BC = (5,5) \quad \therefore$ centre is $(5,5)$ (d) radius $= \frac{1}{2} \times BC = \frac{1}{2}\sqrt{40} = \sqrt{10}$	M1 A3,2,1 M1 A1A1 M1A1 M1A1 (11)
8	(a) $\left(1+\frac{x}{4}\right)^{\frac{1}{3}} = 1+\frac{1}{3}\left(\frac{x}{4}\right)+\frac{\frac{1}{3}\times\left(-\frac{2}{3}\right)}{2!}\left(\frac{x}{4}\right)^2+\ldots = 1+\frac{x}{12}-\frac{x^2}{144}+\ldots$ (b) $\left(1-\frac{x}{4}\right)^{\frac{-1}{3}} = 1+\frac{-1}{3}\left(-\frac{x}{4}\right)+\frac{\frac{-1}{3}\times\left(-\frac{4}{3}\right)}{2!}\left(\frac{-x}{4}\right)^2+\ldots = 1+\frac{x}{12}+\frac{x^2}{72}+\ldots$ (c) $\lvert x\rvert < 4$ (d) $\left(\frac{4+x}{4-x}\right)^{\frac{1}{3}} = \left(\frac{1+\frac{x}{4}}{1-\frac{x}{4}}\right)^{\frac{1}{3}} = \left(1+\frac{x}{12}-\frac{x^2}{144}+\ldots\right)\left(1+\frac{x}{12}+\frac{x^2}{72}+\ldots\right)$ $= 1+\frac{x}{12}+\frac{x^2}{72}+\frac{x}{12}+\frac{x^2}{144}-\frac{x^2}{144}+\ldots = 1+\frac{x}{6}+\frac{x^2}{72}+\ldots$ (e) $\int_0^{0.3}\left(\frac{4+x}{4-x}\right)^{\frac{1}{3}}dx = \int_0^{0.3}\left(1+\frac{x}{6}+\frac{x^2}{72}\right)dx = \left[x+\frac{x^2}{12}+\frac{x^3}{216}\right]_0^{0.3}$ $= 0.3+\frac{0.3^2}{12}+\frac{0.3^3}{216} = 0.3076\ldots = 0.308$	M1A2,1,0 M1A2,1,0 B1 M1M1A1 M1A1√ M1A1 (14)
9	(a) $q^3 = 343 \quad q = 7$ (b) $5n+9 = 4^3 = 64, \quad 5n = 55 \quad n = 11$ (c) $\log_m 4 + \frac{8}{\log_m 4} = 6$ $(\log_m 4)^2 - 6\log_m 4 + 8 = 0 \quad (\log_m 4 - 4)(\log_m 4 - 2) = 0$ $\log_m 4 = 4 \quad m^4 = 4 \quad m = \sqrt{2} \quad \log_m 4 = 2 \quad m^2 = 4 \quad m = 2$ (d) $(2-3x)\log_3 x - 2(2-3x) = 0$ $(2-3x)(\log_3 x - 2) = 0$ $x = \frac{2}{3}, \quad \log_3 x = 2 \quad x = 9$	M1A1 M1,M1A1 M1 M1A1 M1A1A1 M1A1 B1, M1A1 (16)

10	(a) (i) $y=\frac{1}{2}$ (ii) $x=-\frac{1}{2}$ (b) $(0,-\frac{1}{2})$ $(\frac{1}{2},0)$ (c)  (d) $\dfrac{dy}{dx}=\dfrac{2(4x+2)-4(2x-1)}{(4x+2)^2}$ $x=0$ $\frac{dy}{dx}=\frac{8}{4}=2$, grad. normal $=-\frac{1}{2}$ Eqn. normal: $y+\frac{1}{2}=-\frac{1}{2}x$ (e) $-\frac{1}{2}x-\frac{1}{2}=\frac{2x-1}{4x+2}$ $-(4x+2)(x+1)=4x-2$ $-(4x^2+6x+2)=4x-2$ $4x^2+10x=0$ $2x(2x+5)=0$ $(x=0)$, $x=-\frac{5}{2}$ $y=\frac{-5-1}{-10+2}=\frac{3}{4}$	B1 B1 B1 B1 G1 (2 branches) G1 (asymptotes G1 (intersects.) M1A1 M1,A1√ B1 M1 A1 M1,A1A1 (17)