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Mark Scheme (Results)
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GCE

O Level Pure Mathematics (7362_02)

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Pure Mathematics 7362

Paper 2

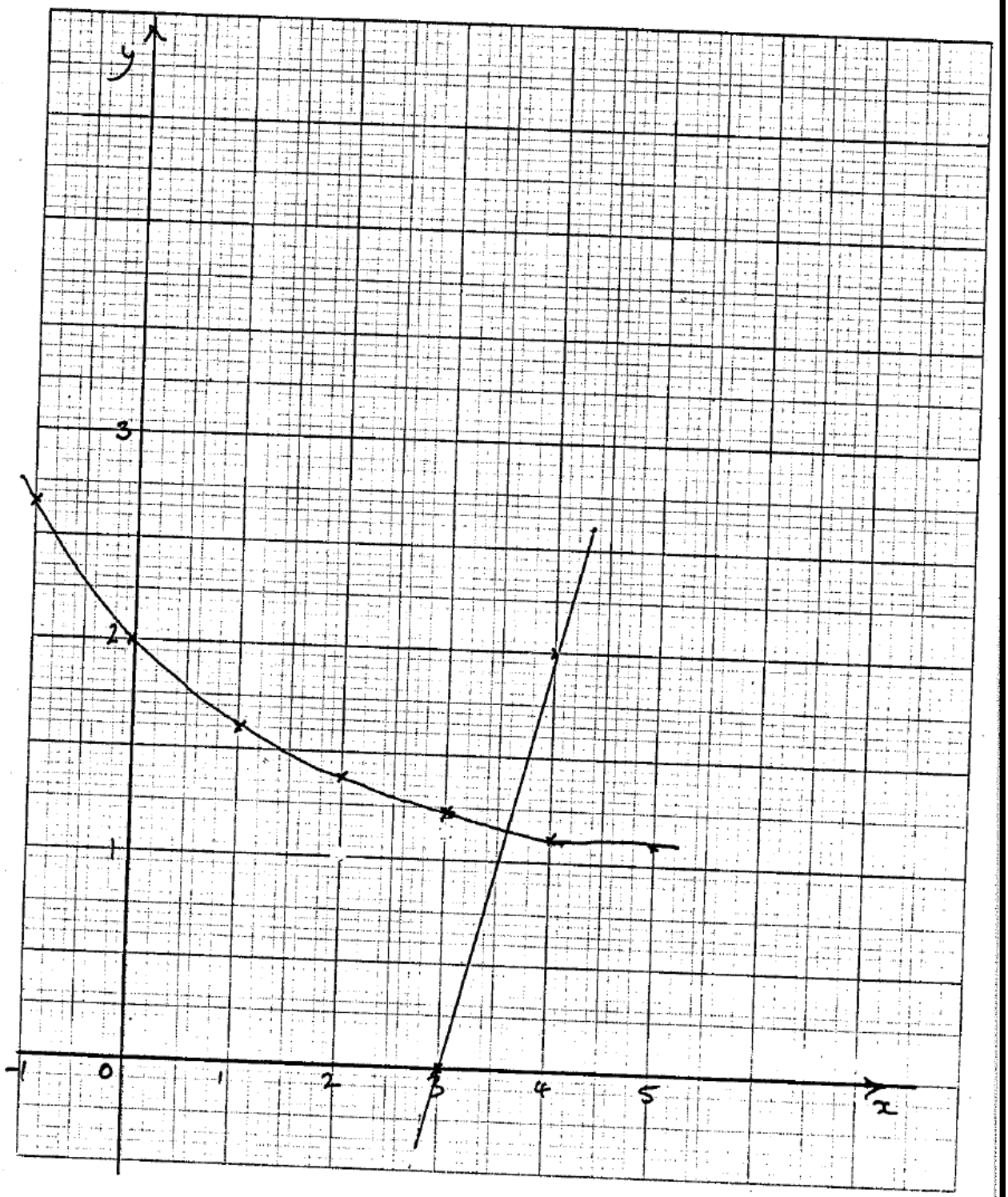
1	$\cos\theta = \dfrac{4.6^2 + 5.3^2 - 6.5^2}{2\times 4.6\times 5.3}$, $\theta = 81.7° = 82°$	M1A1,A1 (3)
2	$S_{10} = 5(2a+9d) = 295$, $S_8 = 4(2a+7d) = 196$ $2a+9d = 59$ $2a+7d = 49$ $2d = 10$ $d = 5$ $a = \frac{49-7\times 5}{2} = 7$	M1,A1 M1A1 A1 (5)
3	$\log_3(5x+12) + \log_3 x = 2$ $\log_3\left[x(5x+12)\right] = 2$ $5x^2+12x = 3^2$, $5x^2+12x-9 = 0$ $(5x-3)(x+3) = 0$ $x = \frac{3}{5}$ ($x = -3$, not poss).	M1 M1,M1A1 A1 (5)
4	(a) $\overrightarrow{OT} = (5\mathbf{i}+12\mathbf{j})$ (by ratio formula or vectors) (b) $\sqrt{5^2+12^2} = 13$ unit vector $= \frac{1}{13}(5\mathbf{i}+12\mathbf{j})$	M1A1A1 M1A1 (5)
5	(a) $\cos 2\theta = \cos^2\theta - \sin^2\theta = \cos^2\theta - (1-\cos^2\theta) = 2\cos^2\theta - 1$ (b) $\text{Vol} = \int_0^{\frac{\pi}{8}} \pi\times 9\cos^2 2x \, dx, = \frac{9}{2}\pi\int_0^{\frac{\pi}{8}}(\cos 4x+1)\,dx$ $= \frac{9}{2}\pi\left[\frac{1}{4}\sin 4x + x\right]_0^{\frac{\pi}{8}}, = \frac{9}{2}\pi\left[\frac{1}{4}\sin\frac{\pi}{2} + \frac{\pi}{8} - 0\right] = \frac{9}{16}\pi^2 + \frac{9}{8}\pi$	M1A1 M1,M1 M1A1, M1A1 (8)
6	(a) $(x+2)(7x-4) = (3x)^2$ $7x^2+10x-8 = 9x^2$ $x^2-5x+4 = 0$, $(x-1)(x-4) = 0$ $x = 4$, $x = 1$ $x = 1$ terms are 3,3,3 $\Rightarrow x = 4$ and $a = 6$ (b) $r = \frac{12}{6} = 2$ (c) $S_{17} = \frac{6(2^{17}-1)}{2-1} = 786426$	M1 A1,M1A1 A1 B1 M1A1 (8)

7	(a) mid-point is $\left(1\frac{1}{2}, 4\frac{1}{2}\right)$ grad AB $= \frac{5-4}{5+2} = \frac{1}{7}$, grad perp. $= -7$ eqn. perp bisector: $y - 4\frac{1}{2} = -7\left(x - 1\frac{1}{2}\right)$, $y + 7x = 15$ (b) perp bisector of AC : $x = 2$ (c) centre of circle where perp bisectors cross (i) centre is $(2,1)$ (ii) radius $= \sqrt{\left(4^2 + 3^2\right)} = 5$	B1 M1,A1 M1,A1 B1 M1 A1 M1A1 (10)
8	(a) x: -1, **2.65**; 0, 2; 1, 1.61; 2, **1.37**; 3, 1.22; 4, 1.14; 5, **1.08** (b) Graph (c) $e^{-\frac{1}{2}x} + 1 = 1.8$, $x = 0.45$ (d) $x = -2\ln(2x-7)$ $-\frac{1}{2}x = \ln(2x-7)$ $e^{-\frac{1}{2}x} + 1 = 2x - 7 + 1$ Draw $y = 2x - 6$. $x = 3.6$	B2,1,0 G2 M1A1 M1A1 M1A1 (10)
9	(a) $\alpha\beta = \frac{3}{2}$, $x^2 - \left(\frac{9}{4} + \frac{4}{9}\right)x + 1 = 0$ $36x^2 - 97x + 36 = 0$ (b) $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = \left(-\frac{p}{2}\right)^2 - 2 \times \frac{3}{2} = \frac{p^2}{4} - 3$ $x^2 - \left(\frac{p^2}{4} - 3\right)x + \frac{9}{4} = 0$ (c) $\alpha^2 = 3$ $\alpha^2\beta^2 = \frac{9}{4}$ $\beta^2 = \frac{3}{4}$ (d) $\frac{p^2}{4} - 3 = 3 + \frac{3}{4}$ $\frac{p^2}{4} = \frac{27}{4}$ $p^2 = 27$ $p = \pm\sqrt{27}$ (± 5.2)	M1M1 A1 M1A1 B1($\underline{AB}$)^2 M1A1 M1A1 M1M1A1 (13)

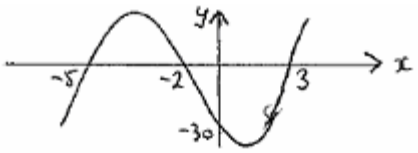
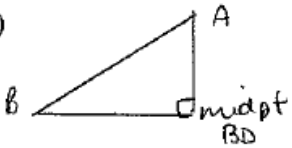
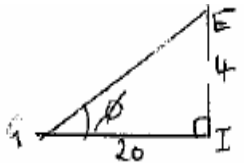
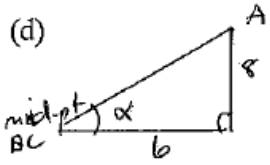
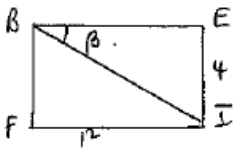
CSE and GCE Examining Bodies

2mm GRAPH PAPER

Examining body	Jan 2007 Paper 2	Centre number	
Candidate name	No 8.	Candidate number	
Paper reference		Question number	Sheet number



GP02

10	(a) $-125+25p+55+q=0$ $25p+q=70$ $27+9p-33=0$ $9p+q=6$ (b) $16p=64 \quad p=4 \quad q=-30$ (c) $x^3+4x^2-11x-30=(x+5)(x-3)(x+2)$ (d)  (e) $y=x^3+4x^2-11x-30 \quad \frac{dy}{dx}=3x^2+8x-11$ At min. $(3x+11)(x-1)=0$ min. at $(1,-36)$ Tgt: $y=-36$ meets curve where $x^3+4x^2-11x-30=-36$ $x^3+4x^2-11x+6=0 \quad (x-1)(x-1)(x+6)=0 \quad x=-6$ ie at (	M1A1 A1 M1A1A1 B1 G1 G1 G1 M1 M1A1 M1 M1A1 (16)
11	(a) (i) $GE^2=12^2+16^2+4^2=416 \quad GE=20.4$ (ii)  $BD=20$ $AB^2=64+100 \quad AB=12.8$ (b) $\tan\phi=\frac{4}{20}$ ϕ=11.3°  (c) $\tan\theta=\frac{8}{20}\times 2=\frac{4}{5} \quad \theta=38.7°$ (d)   $\tan\alpha=\frac{8}{6} \quad (\alpha=53.13°)$ $\tan\beta=\frac{4}{12} \quad (\beta=18.43°)$ reqd. angle $=71.56°=71.6°$	M1A1A1 B1 M1A1 M1A1 Ö A1 M1A1 Ö A1 M1A1 M1A1 A1 (17)