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Mark Scheme (Results)
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GCE

O Level Pure Mathematics (7362_01)

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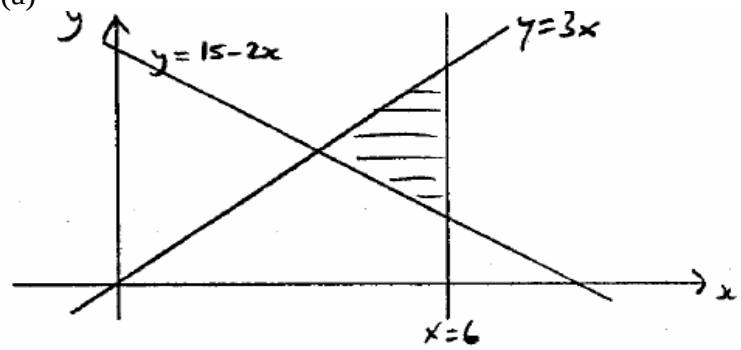
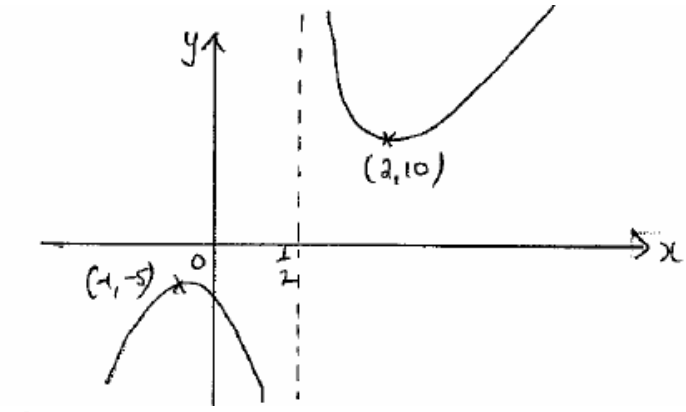
Pure Mathematics 7362

Paper 1

Q.	Scheme	Marks
1	$y=(x+2)\mathrm{e}^{3x}$ $\quad y'=\mathrm{e}^{3x}+3\mathrm{e}^{3x}(x+2)(=7\mathrm{e}^{3x}+3x\mathrm{e}^{3x})$	M1A1A1 (3)
2	(a)  (b) Shading	G1G1G1 B1 (4)
3	$y=3x^2-4x+2$ $\quad x+7y=8$ $8-7x=3x^2-4x+2$ $3x^2+3x-6=0$ $\quad x^2+x-2=0$ $(x+2)(x-1)=0$ $\quad x=-2,\ x=1$ $y=22,\ y=1$ Points are $(-2,22)$ $\quad (1,1)$	M1 A1 M1 A1A1 (5)
4	$\frac{\mathrm{d}A}{\mathrm{d}t}=30$ $A=\pi r^2$ $\quad \frac{\mathrm{d}A}{\mathrm{d}r}=2\pi r,\ \ 40=\pi r^2\ \ r=\sqrt{\left(\frac{40}{\pi}\right)}$ $\frac{\mathrm{d}r}{\mathrm{d}t}=\frac{\mathrm{d}A}{\mathrm{d}t}\times\frac{\mathrm{d}r}{\mathrm{d}A}=\frac{30}{2\pi r}$ $=\frac{30}{2\pi}\times\sqrt{\left(\frac{\pi}{40}\right)}=1.338...=1.3$ cm/s	B1, B1 M1A1 M1A1 (6)
5	(a) $\sum_{r=1}^{n}(7r-3)=\frac{n}{2}(4+7n-3)=\frac{n}{2}(7n+1)$ (b) $\frac{30}{2}(7\times30+1)-\frac{14}{2}(7\times14+1),\ \ =15\times211-7\times99=2472$	M1A1A1 M1A1A1 M1

	(c) $\frac{n}{2}(7n+1)=1020$ $7n^2+n-2040=0$ $(7n+120)(n-17)=0$ (or formula) $n=17$	M1 A1 (9)
6	(a) $t(t^2-7t+10)=t(t-5)(t-2)=0$ $t=5,2$ (b) $v=3t^2-14t+10$ $t=2 \quad v=3\times4-14\times2+10=-6,$ speed $=6$ $t=5 \quad v=3\times25-14\times5+10=15$ (c) $\frac{dv}{dt}=6t-14$ max/ min when $t=\frac{7}{3}$ $v=3\times\left(\frac{7}{3}\right)^2-14\left(\frac{7}{3}\right)=10=-6\frac{1}{3}$ $t=0\Rightarrow v=-10,$ speed $=10$ from above, $t=5\Rightarrow v=15$ $\therefore$ max speed is 15 m/s	M1 A2,1,0 M1 A1, A1ft A1 M1 A1 M1A1 A1 (12)
7	(a) $A=20w^2+4wh+10wh$ $V=10w^2h$ $A=20w^2+14\times\frac{540}{10w}=20w^2+\frac{756}{w}$ (b) $\frac{dA}{dw}=40w-\frac{756}{w^2},$ $w^3=\frac{756}{40} \quad w=2.663...=2.66$ (c) $\frac{d^2A}{dw^2}=40+\frac{1512}{w^3}$ $w=2.663...=2.66 \quad \frac{d^2A}{dw^2}>0 \quad \therefore$ min (d) $A_{min}=20w^2+\frac{756}{w}=425.7...=426$	B1 B1 M1A1 M1A1, M1 M1A1 M1A1 M1A1 (13)
8	(a) $p\cos(\theta+\alpha)=p(\cos\theta\cos\alpha-\sin\theta\sin\alpha)$ $p\cos\theta\cos\alpha-p\sin\theta\sin\alpha=5\cos\theta-12\sin\theta$ $p\sin\alpha=12, \quad p\cos\alpha=5$ $p^2(\sin^2\alpha+\cos^2\alpha)=12^2+5^2 \quad p^2=169 \quad p=13$ $\cos\alpha=\frac{5}{13} \quad \alpha=1.176...=1.18$ (b) $13\cos(\theta+\alpha)=9 \quad \cos(\theta+\alpha)=\frac{9}{13}$ $\theta+\alpha=0.806, \quad 5.477, \quad 7.089, \quad \theta=4.30, \quad 5.91$ (c) $\int_0^{\frac{\pi}{3}} f(\theta)\,d\theta=\int_0^{\frac{\pi}{3}}(5\cos\theta-12\sin\theta)\,d\theta$ $=\left[5\sin\theta+12\cos\theta\right]_0^{\frac{\pi}{3}}$ $=\left[5\times\frac{\sqrt{3}}{2}+12\times\frac{1}{2}-(0+12)\right]=-6+\frac{5\sqrt{3}}{2}$	M1 M1 M1A1 A1 M1 M1A1A1 M1A1 M1 M1A1 (14)

9	(a) $1+5x\times\frac{1}{3}-\frac{\frac{1}{3}\times\left(-\frac{2}{3}\right)}{2!}\left(25x^2\right)+\frac{\frac{1}{3}\times\left(-\frac{2}{3}\right)\left(-\frac{5}{3}\right)}{3!}125x^3=1+\frac{5x}{3}-\frac{25}{9}x^2+\frac{625}{81}x^3$ (b) $\left(1+\frac{5}{8}\right)^{\frac{1}{3}}=\sqrt[3]{\frac{13}{8}}=\frac{1}{2}\sqrt[3]{13}$ $1+\frac{5}{24}-\frac{25}{9}\times\frac{1}{64}+\frac{625}{81}\times\frac{1}{512}=1.1800009$ $2\times1.1800009=2.360$ (c) $\frac{\left\lvert\sqrt[3]{13}-2.3600\right\rvert}{\sqrt[3]{13}}\times100\%=0.368\%...=0.37\%$ (d) $(1+x)^4=1+4x+6x^2...$ $\left(a+bx+cx^2\right)\left(1+4x+6x^2\right),=a+x\left(b+4a\right)+x^2\left(c+4b+6a\right)$ $a=1\quad b+4a=\frac{5}{3}\quad b=-\frac{7}{3}\quad c+4b+6a=-\frac{25}{9}\quad c=\frac{5}{9}$	M1A3,2,1,0 M1A1 B1 B1 M1A1 M1,M1 M1A3,2,1,0 (16)
10	(a) $x=\frac{1}{2}$ (b) $\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{10x\left(2x-1\right)-2\left(5x^2+10\right)}{\left(2x-1\right)^2}$ $\frac{\mathrm{d}y}{\mathrm{d}x}=0\quad 2x^2-x-x^2-2=0$ $x^2-x-2=0\quad\left(x-2\right)\left(x+1\right)=0\quad x=2,\ \ x=-1$ $x=2\quad y=10\quad\left(2,10\right)$ $x=-1\ \ y=-5\quad\left(-1,-5\right)$ (c)  (d) A is $(0,-10)$ Grad. tgt $=-20$ Eqn. tgt: $y+10=-20x$ (e) Grad. normal = $\frac{1}{20}$, Eqn. normal: $y+10=\frac{1}{20}x$ (f) tgt. meets x-axis at $-\frac{1}{2}$ normal meets x-axis at 200 Area $=\frac{1}{2}\times10\times200.5=1002.5$	B1 M1A1A1 M1 A1 A1 G1 G1 G1 B1 M1A1 B1Ö ,B1 M1(200.5) M1A1 (18)