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Mark Scheme (Results)
January 2008

GCE O Level

O Level Pure Mathematics (7362_01)

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Pure Mathematics, 7362

Paper 1

Q.	Scheme	Marks
1	$\cos M = \dfrac{5^2+6.4^2-8.2^2}{2\times5\times6.4}, \quad M = 91.1°$	M1A1,A1 (3)
2	$\sum_{r=7}^{50}(3r-5) = \frac{44}{2}(32+129) = 3542$	B1(44) M1A1 A1 (4)
3	(a) $\dfrac{dv}{dt} = -2+2t$, accel when $t=3$ is 4 m/s^2 (b) dist $= \int_0^4 5-2t+t^2 dt = \left[5t-t^2+\frac{1}{3}t^3\right]_0^4, = 20-16+\frac{64}{3} = 25\frac{1}{3}$ m	M1A1,A1 M1A1,A1 (6)
4	(a) $\dfrac{dy}{dx} = 3e^{2x}+(3x-2)\times 2e^{2x}$ (b) $e^{2x} = \dfrac{y}{(3x-2)} \quad \dfrac{dy}{dx} = 3\dfrac{y}{(3x-2)}+(3x-2)\times 2\dfrac{y}{(3x-2)}$ $(3x-2)\dfrac{dy}{dx} = 3y+6xy-4y = (6x-1)y$	M1A1A1 M1A1 A1 (6)
5	(a) $V = \pi r^2 h = 50000\pi \quad r^2 h = 50000$ $A = 2\pi rh+\pi r^2, = 2\pi r\times\frac{50000}{r^2}+\pi r^2$ $= \left(\frac{100000}{r}+r^2\right)\pi$ (b) $\frac{dA}{dr} = \left(-100000r^{-2}+2r\right)\pi$ $\frac{dA}{dr} = 0 \quad 2r = \frac{100000}{r^2}, \quad r^3 = 50000 \quad r = 36.84$ $\frac{d^2A}{dr^2} = \left(200000r^{-3}+2\right)\pi > 0 \quad \therefore$ minimum $A_{\min} = 12791$	B1 M1,M1 A1 M1 M1,A1 M1A1, B1 (10)
6	(a) $\alpha+\beta = 2 \quad (\alpha+\beta)+\frac{1}{\alpha+\beta} = 2+\frac{1}{2} = \frac{5}{2}$ $x^2-\frac{5}{2}x+1 = 0 \quad 2x^2-5x+2 = 0$ (b) $\frac{\alpha+\beta}{\alpha}+\frac{\alpha+\beta}{\beta} = \frac{\alpha\beta+\beta^2+\alpha^2+\alpha\beta}{\alpha\beta} = \frac{(\alpha+\beta)^2}{\alpha\beta} = \frac{12}{p}$ Prod. $= \frac{(\alpha+\beta)^2}{\alpha\beta} = \frac{12}{p}$, Eqn. $x^2-\frac{12}{p}x+\frac{12}{p} = 0$ (c) $x=3$: $9-\frac{36}{p}+\frac{12}{p} = 0, \quad 9 = \frac{24}{p} \quad p = \frac{8}{3}$ (d) sum $= \frac{12}{p} = \frac{9}{2}$ other root $= \frac{9}{2}-3 = \frac{3}{2}$	M1,A1 M1A1 M1A1 B1,B1 M1A1 M1A1 (12)

7	(a) $(5x-9)(12x+4)=(7x-3)^2$	M1
	$60x^2-88x-36=49x^2-42x+9$	
	$11x^2-46x-45=0$	A1
	$(11x+9)(x-5)=0 \quad x=\frac{-9}{11} \quad x=5$	M1A1A1
	(b) $x=5 \quad 16,32,64 \quad r=2$	M1A1
	(c) $a=\frac{16}{r^2}=4$	M1A1
	(d) $S_{12}=\frac{4\left(2^{12}-1\right)}{1}=16380$	M1A1
		(11)
8	(a) $f'(x)=3x^2-4x-4 \qquad f(x)=x^3-2x^2-4x+c$	M1A1
	thro' $(1,0) \qquad 0=1-2-4+c \quad c=5$	B1
	$\therefore f(x)=x^3-2x^2-4x+5$	
	(b) $3x^2-4x-4=0 \quad (3x+2)(x-2)=0 \quad x=\frac{-2}{3} \quad x=2$	M1
	P is $\left(\frac{-2}{3},6\frac{13}{27}\right) \qquad Q$ is $(2,-3)$	A1A1
	(c) (i) tang. at P: $\quad y=6\frac{13}{27}$	B1 √
	(ii) normal at Q: $\quad x=2$	B1 √
	(d) $\int_{\frac{-2}{3}}^{1}\left(x^3-2x^2-4x+5\right)dx=\left[\frac{1}{4}x^4-\frac{2}{3}x^3-2x^2+5x\right]_{\frac{-2}{3}}^{1}$	M1A1 √
	$=\left(\frac{1}{4}-\frac{2}{3}-2+5\right)-\left(\frac{1}{4}\times\frac{16}{81}+\frac{2}{3}\times\frac{8}{27}-2\times\frac{4}{9}-5\times\frac{2}{3}\right)=6\frac{1813}{324}$	M1
	$\int_{1}^{2}\left(x^3-2x^2-4x+5\right)dx=4-\frac{16}{3}-8+10-\left(\frac{1}{4}-\frac{2}{3}-2+5\right)=-1\frac{11}{12}$	M1
	Reqd. area $=6\frac{13}{27}\times 2\frac{2}{3},+1\frac{11}{12}-6\frac{1813}{324}=12\frac{52}{81}$	B1,M1A1
		(15)
9	(a) $\cos 2\theta=\cos^2\theta-\sin^2\theta=\cos^2\theta-\left(1-\cos^2\theta\right)=2\cos^2\theta-1$	M1A1
	(b) $\sin 2\theta=\sin\theta\cos\theta+\sin\theta\cos\theta=2\sin\theta\cos\theta$	B1
	(c) $\cos 3\theta=\cos(2\theta+\theta)=\cos 2\theta\cos\theta-\sin 2\theta\sin\theta$	M1
	$=\left(2\cos^2\theta-1\right)\cos\theta-2\sin^2\theta\cos\theta$	M1
	$=2\cos^3\theta-\cos\theta-2\left(1-\cos^2\theta\right)\cos\theta=4\cos^3\theta-3\cos\theta$	M1A1
	(d) $9\cos\theta-12\cos^3\theta=2 \quad -3\left(4\cos^3\theta-3\cos\theta\right)=2$	M1
	$-3\cos 3\theta=2 \quad \cos 3\theta=-\frac{2}{3} \quad 3\theta=2.3005,\ 3.9826,\ 8.$	M1
	$\theta=0.767, \quad 1.33, \quad 2.86$	A2,1,0
	(e) $\int_0^{\frac{\pi}{2}}\left(3\cos^3\theta+2\sin\theta\right)d\theta=\int_0^{\frac{\pi}{2}}\frac{3}{4}\left(\cos 3\theta+3\cos\theta\right)+2\sin\theta\ d\theta$	M1
	$=\left[\frac{3}{4}\left(\frac{1}{3}\sin 3\theta+3\sin\theta\right)-2\cos\theta\right]_0^{\frac{\pi}{2}}$	M1A1
	$=\frac{3}{4}\left(\frac{1}{3}\times(-1)+3-0\right)-0+2=4$	M1A1 (16)

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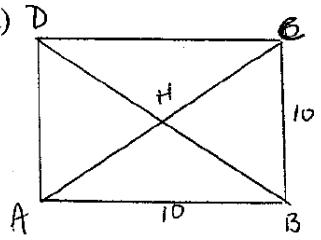
(a)

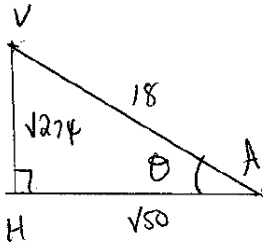


$HB^2 = \frac{1}{4}\left(10^2 + 10^2\right) = \frac{200}{4} = 50$ M1

$VH^2 = 18^2 - 50$

$VH = \sqrt{274} = 16.6 \text{ cm}$ M1A1

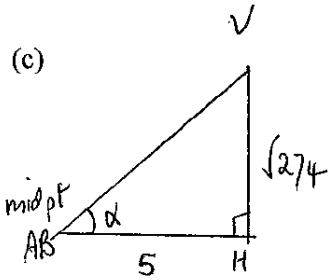
(b)



$\cos\theta = \frac{\sqrt{50}}{18}$ M1A1

$\theta = 66.86... = 66.9°$ A1

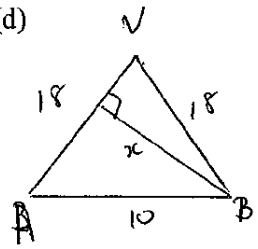
(c)



$\tan\alpha = \frac{\sqrt{274}}{5}$ M1A1

$\alpha = 73.19... = 73.2°$ A1

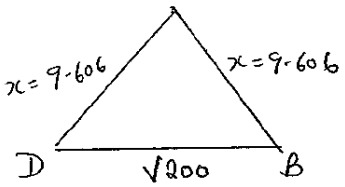
(d)



$\sin\left(\frac{1}{2}AVB\right) = \frac{5}{18}$ $\angle AVB = 32.255$ M1A1

$\sin AVB = \frac{x}{18}$ $x = 9.606... = 9.61 \text{ cm}$ M1A1

(e)



$\sin\frac{1}{2}\phi = \frac{\frac{1}{2}\sqrt{200}}{9.606}$ M1A1

$\frac{1}{2}\phi = 47.4°$ A1

$\phi = 94.8°$ A1 (17)