Mark Scheme

Mark Scheme 4752 MEI PURE MATHS C2 JANUARY 2005

Section A

1	$6x^5 + \frac{1}{2}x^{-\frac{1}{2}}$ o.e.	B1 B1 B1	$6x^5$ $x^{\frac{1}{2}}$ soi $\frac{1}{2}x^{-\frac{1}{2}}$ isw	3
2	$x^4/4$ $\frac{x^{-2}}{-2}$ c	B1 B2 B1	 B1 for kx^{-2}	4
3	At least 1 period of sine curve Sine curve from 0 to 360 191.537 rot to 3 or more sf 348.463 rot to 3 or more sf	G1 G1 B1 B1	 ± 1 indicated After B1 B1, -1 for extras in the range SC1 for 192.8 and 347.2 (grads) SC1 for 180.2 and 359.8 (radians)	4
4	9.0 or 8.96 or 8.960 13.2577	B3 B2	M1 for $[BC^2=]6.8^2+4.1^2-2\times4.1\times6.8\times\cos108$ A1 for 80.2(8..), 8.37(grads), 6.49 (rads) Correctly rounded to 3 or more sf M1 for $0.5\times4.1\times6.8\times\sin108$ For complete long methods using BC, allow M1 and A1 for 13.2 to 13.3	5 **[16]**
5	$a = 4$, $r = 1/2$ identified 2^{-17} 8	B1 T2 S2	Stated or identified by correct use M1 20^{th} term = their(*a*)x(their *r*)^{19} M1 S = their (*a*) / (1–their (*r*))	5
6	4, 7, 10, 13, 16 ignore extras 15250	B1 B4	For showing 1st four or 2nd four terms B1 for d = 3 soi B1 for $a = 4$ soi M1 for use of $100/2[2a + 99d]$ o.e.	5
7	(i) 2.4, $2\frac{2}{5}$, $\frac{12}{5}$ (ii) 22	B3 P2	M1 for $30 = ½ \times 25 \times q$ o.e. M1 for $q = (2 \times 30) / 5^2$ M1 for (arc =)5 x their 2.4	5
8	(i) 2.5, 2.50, 2.500, 2.499.. (ii) 6 www	B2 B3	M1 for $\log_{10} 316$ or ln 316/ln 10 B2 for $6 \log_a a$ or $\log_a(a^6)$ Or B1 for $2\log_a(a)$ or $-\log_a a^{-4}$ SC1 Using a=10 ⇒ 6 SC2 Using numerical a, not 10 ⇒ 6	5 **[20]**
			Total for section A	36

Mark Scheme 4752 MEI PURE MATHS C2 JANUARY 2005

Section B

9	**i*A***	6.25	B2	M1 for $x = 5$ used to find y	2
	i*B*	(V =) area of cross-section × length	E1		
		$(\frac{100}{4})[\frac{10}{2}x^2 - \frac{1}{3}x^3]$ o.e.	M1		
		[val at $x = 10$] – [val at $x = 0$]	M1	Subs of correct limits into their integrand	
		4166 to 4167 or 4170	A2	A1 for 166.6... or 16666.6... or 41.6…rot to 3 sf or more	5
	ii	52.62	B4	M3 for- 2/2×[2.15x2+2(5.64x2+6.44x2)]oe Or M2 if one slip Or M1 if 2 slips or one trap evaluated	5 **[12]**
		Their(5262) – their (4167)	M1	Must be >0	
10	**i**	$y' = 3x^2 - 12x$	B1B1		
		use of $y' = 0$	M1		
		$x = 0$ and 4	A1		
		(0, 12) and (4, –20)	A1	Allow y = 12 and y = -20	
		$y'' = 6x - 12$ used	M1	y' used each side of TP or good sketch	7
		max when $x = 0$, min when $x = 4$	A1	Both stated, only one needs testing	
	ii	when $x = 2$ $y' = -12$	B1		
		grad of normal = 1/12	B1ft	from their y'	
		$y + 4 = 1/12(x - 2)$	M1ft	accept any numerical m Or -4 = their(m) x 2 + c	4 **[11]**
		$y = \frac{1}{12}x - 4\frac{1}{6}$	A1	Any recognisable 25/6, at worst 4.1	
11	**i**	Excess temperature	B1		2
		At t =0 oe	B1		
	ii	$\log z = \log z_0 + \log (10^{-kt})$	B1		
		$= \log z_0 - kt\log 10$	B1	nb AG	2
	iii	Z= 46 31 20 14 9		If z= 68, 53…P1, L1,M1, M1, M1 available	
		log *z* : 1.66 1.49 1.30 1.15 0.95	T1		
		correctly plotted	P1	ft their values, within 2mm	
		line of best fit	L1	Ruled, using their points	
		k = 0.017 to 0.019 or 0.02	G2	M1 for attempting +/- gradient	9
		z_0= 66 to 73	B2	M1 for (log) z_0= 1.82 to 1.86	
		temp of drink = 25 to 27	C2	M1 3 to 5 or their $69 \times 10^{-70 \text{ x their } k}$	**[13]**