Mark Scheme 4752
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Section A

1	$\dfrac{5}{2} \times 6x^{\frac{3}{2}}$	1+1	- 1 if extra term	2
2	-0.2	3	M1 for $5 = \dfrac{6}{1-r}$ and M1 dep for correct constructive step	3
3	√8 or 2√2 not ±√8	3	M1 for use of $\sin^2 θ + (1/3)^2 = 1$ and M1 for $\sin θ = √8/3$ (ignore ±) Diag.: hypot = 3, one side =1 M1 3rd side √8 M1	3
4	(i) C (ii) B (iii) 2^{n-1}	1 1 1		3
5	(i) −0.93, -0.930, -0.9297… (ii) answer strictly between 1.91 and 2 or 2 and 2.1 (iii) $y' = -8/x^3$, gradient = −1	2 B1 M1A1	M1 for grad = (1 − their y_B)/(2 − 2.1) if M0, SC1 for 0.93 don't allow 1.9 recurring	5
6	At least one cycle from (0, 0) amplitude 1 and period 360[°] indicated 222.8 to 223 and 317 to 317.2 [°]	G1 G1dep 2	 1 each, ignore extras	4
7	$x < 0$ and $x > 6$	3	B2 for one of these or for 0 and 6 identified or M1 for $x^2 -6x > 0$ seen (M1 if y found correctly and sketch drawn)	3
8	$a + 6d = 6$ correct $30 = \dfrac{10}{2}(2a + 9d)$ correct o.e. elimination using their equations $a = -6$ and $d = 2$ 5th term = 2	M1 M1 M1f.t. A1 A1	 Two equations in a and d	5
9	$(y =) 2x^3 + 4x^2 - 1$ accept $2x^3 + 4x^2 + c$ <u>and</u> c = - 1	4	M2 for $(y =) 2x^3 + 4x^2 + c$ (M1 if one error) and M1 for subst of (1, 5) dep on their y =, +c, integration attempt.	4
10	(i) $3 \log_a x$ ii) $b = \dfrac{1000}{c}$	2 2	M1 for $4 \log_a x$ or $- \log_a x$; or $\log x^3$ M1 for 1000 or 10^3 seen	4

Section B

11	i	Correct attempt at cos rule	M1	any vertex, any letter	
		correct full method for C	M1		
		C = 141.1…	A1		
		bearing = [0]38.8 cao	A1	or B4	4
	ii	½ × 118 × 82 × sin their C or supp.	M1	or correct use of angle A or angle B	2
		3030 to 3050 [m^2]	A1		
	iiiA	sin (θ/2) = (½ × 189)/130	M1	or cosθ = (130^2+130^2-189^2)/(2x130x130)	2
		1.6276 → 1.63	A1	In all methods, the more accurate number to be seen.	
	iiiB	$0.5 \times 130^2 \times \sin 1.63$	M1	condone their θ (8435)	
		$0.5 \times 130^2 \times 1.63$	M1	condone their θ in radians (13770)	
		their sector − their triangle AOB	M1	dep on sector > triangle	
		5315 to 5340	A1		4
12	i	(2x − 3)(x − 4)	M1	or (11 ±√(121 − 96))/4	
		x = 4 or 1.5	A1A1	if M0, then B1 for showing y = 0 when x = 4 and B2 for x = 1.5	3
	ii	y′ = 4x − 11	M1	condone one error	
		= 5 when x = 4 c.a.o.	A1		
		grad of normal = −1/their y′	M1f.t.		
		y[− 0]=<u>their</u> −0.2 (x − 4)	M1	or 0 = their (-0.2)x4 + c dep on normal attempt	6
		y-intercept for <u>their</u> normal	B1f.t.	s.o.i. normal must be linear or	
		area = ½ × 4 × 0.8 c.a.o.	A1	integrating <u>their</u> f(x) from 0 to 4 M1	
	iii	$\frac{2}{3}x^3 - \frac{11}{2}x^2 + 12x$	M1	condone one error, ignore + c	
		attempt difference between value at 4 and value at 1.5	M1	ft their (i), dep on integration attempt. c.a.o.	
		$[-]5\frac{5}{24}$ o.e. or [−]5.2(083..)	A1		3
13	i	log $_{10}$ y = log $_{10}$ k + log $_{10}$ 10^{ax}	M1		
		log $_{10}$ y = ax + log $_{10}$ k compared to y = mx+c	M1		2
	ii	2.9(0), 3.08, 3.28, 3.48, 3.68	T1	condone one error	
		plots [tol 1 mm]	P1f.t		
		ruled line of best fit drawn	L1f.t.		3
	iii	intercept = 2.5 approx	M1	or y − 2.7 = m(x − 1)	
		gradient = 0.2 approx	M1		
		y = their 300x 10$^{x(their 0.2)}$ or y = 10$^{(their 2.5 + their 0.2x)}$	M1f.t.		3
	iv	subst 75000 in any x/y eqn	M1		
		subst in a correct form of the relationship	M1	B3 with evidence of valid working	3
		11,12 or 13	A1		
	v	"Profits change" or any reason for this.	R1	too big, too soon	1