Mark Scheme 4752
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Section A

1	$1 + \frac{3}{2}x^{\frac{1}{2}}$	1+3	B2 for $kx^{\frac{1}{2}}$, or M1 for $x^{\frac{3}{2}}$ seen before differentiation or B1 ft their $x^{\frac{3}{2}}$ correctly differentiated	4
2	1170	4	B1 for $a = 11$ and B1 for $d = 5$ or 20th term = 106 and M1 for 20/2[their (a) + their(106)] or 20/2[2their (a)+ (20-1)×their(d)] <u>OR</u> M1 for 6×20 and M2 for $5\left(\dfrac{20}{2}[20+1]\right)$ o.e.	4
3	$\pm\sqrt{13}/4$	3	B2 for (-) $\sqrt{13}/4$ or $\pm\sqrt{\dfrac{13}{16}}$ or M1 for $\sqrt{13}$ or $\sin^2\theta + \cos^2\theta = 1$ used	3
4	$x + x^{-1}$ soi $y' = 1 - 1/x^2$ subs $x = 1$ to get $y' = 0$ $y''=2x^{-3}$ attempted Stating $y'' > 0$ so min cao	B1 B1 B1 M1ft A1	$1 - x^{-2}$ is acceptable Or solving $1 - x^{-2} = 0$ to obtain $x = 1$ or checking y' before and after $x = 1$ Valid conclusion First quadrant sketch scores B2	5
5	(i) 1 (ii) –2 (iii) 6log x	1 2 2	 M1 for $1/9=3^{-2}$ or $\log(1) - \log(3^2)$ base not reqd; M1 for 5 log x or $\log(x^6)$	5
6	Correct curve thro' y axis (0, 1) indicated on sketch or table 5.64	G1 G1 3	y, y' & y'' all positive independent B2 for other versions of 5.64(3....) or B1 for other ans 5.6 to 5.7 or M1 for x log 2 = log 50 and M1 for x = log 50 ÷ log 2	5
7	$y = 7 - 3/x^2$ oe	5	B3 for $(y =) -3/x^2 + c$ [B1 for each of k/x^2, $k = -6/2$ and $+c$] and M1 for substituting (1, 4) in their attempted integration with $+ c,$ the constant of integration	5

8	(i) 66° or 66.4 or 66.5….
	     293.58 …. to 3 or more sf cao
	
	 (ii) stretch (one way)
	       parallel to the x-axis
	       sf 0.5
		B1
		 B1
		
		 1
		 1
		 1
			Allow 1.16 or 73.8
			 Lost for extras in range. Ignore extras outside the range
			
			 Horizontal, from y axis, in x axis, oe
				5

				36

Section B

9	i	$3x^2 - 20x + 12$	2	B1 if one error "+c" is an error	2
	ii	$y - 64 = -16(x - 2)$ o.e. eg $y = -16x + 96$	4	M1 for subst $x = 2$ in their y' A1 for $y' = -16$ and B1 for $y = 64$	4
	iii	Factorising $f(x) \equiv (x + 2)(x - 6)^2$ OR Expanding $(x + 2)(x - 6)^2$	B3 M2 E1	or B1 for $f(-2) = -8-40-24+72 = 0$ and B1 for $f'(6) = 0$ and B1dep for $f(6)=0$	3
	iv	$\dfrac{x^4}{4} - \dfrac{10x^3}{3} + 6x^2 + 72x$ value at $(x = 6) \sim$ value at $(x = -2)$ 341(.3..) cao	B2 M1 A1	-1 for each error Must have integrated $f(x)$	4
10	i	AB = 7.8(0), 7.798 to 7.799 seen area = 52.2 to 52.3	2 2	M1 for correct use of sine rule For long methods M1A1 for art 7.8 M1 for [2×][0.5 ×] their AB × 11.4 × sin 36°	4
	ii	tan 0.91 = ST/12.6 ST = 12.6 × tan 0.91 and completion (16.208...) area OSTR = [2×][0.5 ×]12.6 × their(16.2) nb 204. …. area of sector = 0.5 × 12.6² × 1.82 =144.47… Logo = 59.6 to 60.0 arc = 12.6 × 1.82 [=22.9...] perimeter = 55.3 to 55.4	M1 E1 M1 M1 A1 A1 M1 A1	Accept 16.2 if ST is explicit but for long methods with pa check that their explicit expression = 16.2 oe using degrees soi by correct ans Accept 144, 144.5 oe using degrees	8
11	i	81	1		1
	ii	$(1x)3^{n-1}$	1		1
	iii	(GP with) $a = 1$ and $r = 3$ clear correct use GP sum formula	M1 M1	or M1 for $= 1+3+9+ ... +3^{n-1}$	2
	iv	(A) 6 www (B) 243	2 1	M1 for $364 = (3^n - 1)/2$	3
	v	their (ii) > 900 $(y - 1)\log 3 > \log 900$ $y - 1 > \log 900 \div \log 3$ $y = 8$ cao	M1ft M1ft M1 B1	-1 once for = or < seen: condone wrong letter / missing brackets / no base	4