1	$\frac{1}{2}x^6 + 4x^{\frac{1}{2}} + c$	**4**	**B1** for $\frac{1}{2}x^6$, **M1** for $kx^{\frac{1}{2}}$, **A1** for $k = 4$ or $\frac{4}{1}$, **B1** for + c dependent on at least one power increased	allow $\frac{3}{6}x^6$ isw,

2	(i) $\frac{x^4}{4} - x^3 - \frac{x^2}{2} + 3x$	**M2**	**M1** if at least two terms correct	ignore + c
	their integral at 3 − their integral at 1 [= −2.25 − 1.75]	**M1**	dependent on integration attempted	M0 for evaluation of $x^3 - 3x^2 - x + 3$ or of differentiated version
	= −4 isw	**A1**		
	represents area between curve and x axis between x = 1 and 3	**B1**		**B0** for area *under* or above curve between x = 1 and 3
	negative since below x-axis	**B1**		
2	(ii) $y' = 3x^2 - 6x - 1$	**M1**		
	their y' = 0 soi	**M1**	dependent on differentiation attempted	
	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ with a = 3, b = -6 and c = -1 isw	**M1**	or $3(x - 1)^2$ - 4 [= 0] or better	no follow through; NB $\frac{6 \pm \sqrt{48}}{6}$ or better stated without working implies use of correct method
	$x = \frac{6 \pm \sqrt{48}}{6}$ or better as final answer	**A1**	eg **A1** for $1 \pm \frac{2}{3}\sqrt{3}$	**A0** for incorrect simplification, eg 1 ± √48
	$\frac{6 - \sqrt{48}}{6} < x < \frac{6 + \sqrt{48}}{6}$ or ft their final answer	**B1**	allow ≤ instead of <	allow **B1** if *both* inequalities are stated separately and it's clear that both apply allow **B1** if the terms and the signs are in reverse order

3		$\frac{1}{2}x^2 + 3x^{-1} + c$ o.e.	3	1 for each term	3

4	$4x^5$ $-12x^{-\frac{1}{2}}$ $+ c$	1 2 1	M1 for other $kx^{-\frac{1}{2}}$	4

5	$2x^6 + \frac{3}{4}x^{\frac{4}{3}} + 7x + c$	5	1 for $2x^6$; 2 for $\frac{3}{4}x^{\frac{4}{3}}$ or 1 for other $kx^{\frac{4}{3}}$; 1 for $7x$; 1 for $+c$	5

6	$\frac{2}{3}x^{\frac{3}{2}} - 3x^{-2} + c$ o.e.	5	1 for each element	5

7	$x^4/4$ $\frac{x^{-2}}{-2}$ c	B1 B2 B1	B1 for kx^{-2}	4

Question			Answer	Marks	Guidance	
8	(i)		$kx^{\frac{1}{3}-1}$ oe	M1	k is any non-zero constant	
			$4x^{\frac{-2}{3}}$ isw cao	A1	ignore $+ c$	allow any equivalent exact simplified form
				[2]		
8	(ii)		kx^{-3+1} oe	M1	k is any non-zero constant	
			$-3x^{-2}$ isw	A1		allow any equivalent exact simplified form
			$+ c$	A1		
				[3]		