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	$y = 7 - 3/x^2$ 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

3			gradient = $\frac{4\sqrt{9.5}-12}{9.5-9}$ 0.6577 to 0.66 $9 < x_C < 9.5$	M1 A1 B1 **[3]**	 or 0.657656...isw	$4\sqrt{38} - 24\,4\sqrt{38} - 24$ allow $8.53 \le x_C < 9$
4			$6x^2 + 18x - 24$ their $6x^2 + 18x - 24 = 0$ or > 0 or ≥ 0 -4 and + 1 identified oe $x < -4$ and $x > 1$ cao	B1 M1 A1 A1 **[4]**	 or $x \le -4$ and $x \ge 1$	 or sketch of $y = 6x^2 + 18x - 24$ with attempt to find x-intercepts if **B0M0** then **SC2** for fully correct answer

5			$\frac{dy}{dx} = 2x - 7$ *or* $(x\text{-}3.5)^2$ $[-\ 3.5^2]$ $x = 3.5$ $x < 3.5$ www cao	M1 M1 A1 **[3]**	M2 for $x = 3.5$ identified (for example, from symmetry) allow $x \leq 3.5$	mark the final answer

6	$40x^3$	2	-1 if extra term	2

7	**i**	$h = 120/x^2$ $A = 2x^2 + 4xh$ o.e. completion to given answer	B1 M1 A1	 at least one interim step shown	 3
	ii	$A' = 4x - 480/x^2$ o.e. $A'' = 4 + 960 / x^3$	2 2	1 for kx^{-2} o.e. included ft their A' only if kx^{-2} seen ; 1 if one error	 4
	iii	use of $A' = 0$ $x = \sqrt[3]{120}$ or 4.9(3..) Test using A' or A'' to confirm minimum Substitution of their x in A $A = 145.9$ to 146	M1 A1 T1 M1 A1	 Dependent on previous M1	 5

8	$\frac{5}{2} \times 6x^{\frac{3}{2}}$	1+1	- 1 if extra ter	2

9	(i) −0.93, -0.930, -0.9297… (ii) answer strictly between 1.91 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

10	$x < 0$ 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

11	$(y =)\ 2x^3 + 4x^2 - 1$ accept $2x^3 + 4x^2 + c$ and $c = -1$	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