Question Number	Scheme	Marks
2 (a)	Strip width = 1.5	B1
	$\frac{3}{4}\{4.16+2.28+2\times(2.91+a+1.73+1.37+1.43)\}=19.3\Rightarrow a=...$	M1
	$a=$ awrt 2.21	A1
		(3)
(b)	$\int_{-4}^{5}(2\mathrm{f}(x)-3)\mathrm{d}x=2\times19.3-[3x]_{-4}^{5}$	M1
	$=11.6$	A1
		(2)
		Total 5

Question	Answer	Marks	Guidance
1	Use correct logarithm property to simplify left-hand side	**M1**	Or equivalent method
	Use correct process to obtain equation without logarithms	**M1**	
	Obtain $\frac{2x+1}{x-3}=e^2$	**A1**	OE
	Obtain $x=\frac{3e^2+1}{e^2-2}$	**A1**	OE
		4	

Question Number	Scheme	Notes	Marks
3(a)	$a(-4)^3-(-4)^2+b(-4)+4=-108$ Attempts to set $f(-4)=-108$ to obtain an equation in a and b. Score when you see "– 4" embedded in the equation or 2 correct terms (excluding the "+ 4") on lhs. May be implied by e.g. $-64a-16-4b+4=-108$ Condone minor slips on the lhs e.g. one sign error between terms but must use – 108		M1
	As an alternative for the first mark we will condone an attempt at long division. This requires a complete method to divide (ax^3-x^2+bx+4) by $(x+4)$ to obtain a remainder in terms of a and b which is then equated to -108 For reference, the quotient is $ax^2-(1+4a)x+16a+b+4$ and the remainder is $-4b-64a-12$		
	$-64a-16-4b+4=-108$ $\Rightarrow 16a+b=24*$	Correct equation obtained with no errors and at least one line of intermediate working if starting with e.g. $a(-4)^3-(-4)^2+b(-4)+4=-108$	A1*
			(2)
(b)	$a\left(\frac{1}{2}\right)^3-\left(\frac{1}{2}\right)^2+b\left(\frac{1}{2}\right)+4=0$ Attempts to set $f\left(\frac{1}{2}\right)=0$ to obtain an equation in a and b. Condone slips. Score when you see "$\frac{1}{2}$" embedded in the equation or 2 correct terms (excluding the "+ 4") on lhs. May be implied by e.g. $\frac{a}{8}-\frac{1}{4}+\frac{b}{2}+4=0$ The "= 0" may be implied when they attempt to solve simultaneously below		M1
	An alternative for the first mark is to attempt long division. This requires a complete method to divide (ax^3-x^2+bx+4) by $(2x-1)$ to obtain a remainder in a and b which is then equated to 0 For reference, the quotient is $\frac{a}{2}x^2+\left(\frac{a}{4}-\frac{1}{2}\right)x+\left(\frac{b}{2}-\frac{1}{4}+\frac{a}{8}\right)$ and the remainder is $\frac{15}{4}+\frac{b}{2}+\frac{a}{8}$		
	$16a+b=24,\ a+4b=-30$ $\Rightarrow a=...,b=...$	Attempts to solve $16a+b=24$ simultaneously with their equation in a and b. This may be implied if values of a and b are obtained (e.g. calculator)	M1
	$a=2,\ b=-8$	Correct values	A1
			(3)
(c)	$f(x)=2x^3-x^2-8x+4$ $\Rightarrow f'(x)=6x^2-2x-8$	Correct derivative (follow through their a and b). Allow unsimplified and apply isw if necessary. Allow with the letters "a" and "b" and a "made up" "a" and "b".	B1ft
			(1)

Question Number	Scheme	Marks
2a	$\left(f\left(\frac{3}{2}\right)=\right)\ 4\left(\frac{3}{2}\right)^3-8\left(\frac{3}{2}\right)^2+5\left(\frac{3}{2}\right)+a=0\Rightarrow a=...$	M1
	$\Rightarrow\frac{27}{2}-18+\frac{15}{2}+a=0\Rightarrow a=-3\quad *$	A1*
		(2)
b	Example where $2x-3$ is a linear factor: $2x^2-x+1$ $2x-3\overline{)4x^3-8x^2+5x-3}$ $4x^3-6x^2$ $-2x^2+5x$ $-2x^2+3x$ $+2x-3$ $+2x-3$ 0	M1A1
	$(-1)^2-4\times2\times1=-7<0\Rightarrow$ no real roots so $x=\frac{3}{2}$ is the only one real root $*$	dM1A1*
		(4)
		(6 marks)