Question Number	Scheme	Marks
5 (a)	$\int_1^x \frac{1}{4}(3-t)\,\mathrm{d}t = \frac{1}{4}\left[3t-\frac{t^2}{2}\right]_1^x$ or $\int \frac{1}{4}(3-x)\,\mathrm{d}x = \frac{1}{4}\left[3x-\frac{x^2}{2}\right]+C$	M1
	$\frac{1}{4}\left[\left(3x-\frac{x^2}{2}\right)-\left(3-\frac{1}{2}\right)\right]$ or $\frac{1}{4}\left[3(1)-\frac{(1)^2}{2}\right]+C=0$ and $C=-\frac{5}{8}$ Leading to $\frac{1}{4}\left(3x-\frac{x^2}{2}\right)-\frac{5}{8}$ [for $1 \leqslant x \leqslant 2$]*	A1*
		(2)
(b)	$\int_2^x \frac{1}{4}\,\mathrm{d}t + \mathrm{F}(2)$ or $\int \frac{1}{4}\,\mathrm{d}x$ and using + c with $\mathrm{F}(2)=\frac{3}{8}$ or $0.25(x-2)+\mathrm{F}(2)$	M1
	$\int_3^x \frac{1}{4}(t-2)\,\mathrm{d}t + \mathrm{F}(3)$ or $\int \frac{1}{4}(x-2)\,\mathrm{d}x$ and using + c with either $\mathrm{F}(3)=\frac{5}{8}$ or $\mathrm{F}(4)=1$	M1
	$\mathrm{F}(x)=\begin{cases} 0 & x<1 \\ \frac{1}{4}\left(3x-\frac{x^2}{2}\right)-\frac{5}{8} & 1 \leqslant x \leqslant 2 \\ \frac{1}{8}(2x-1) & 2<x \leqslant 3 \\ \frac{1}{4}\left(\frac{x^2}{2}-2x\right)+1 & 3<x \leqslant 4 \\ 1 & x>4 \end{cases}$	A1 A1 B1
		(5)
(c)	$\mathrm{P}(1.2<X<3.1)=\mathrm{F}(3.1)-\mathrm{F}(1.2)$	
	$'\left(\frac{1}{4}\left(\frac{(3.1)^2}{2}-2(3.1)\right)+1\right)'-\left(\frac{1}{4}\left(3(1.2)-\frac{(1.2)^2}{2}\right)-\frac{5}{8}\right)=\frac{89}{160}$ awrt 0.556	M1 A1
		(2)

	Notes		**Total 9**
(a)	**M1**	For a correct method for $1 \leqslant x \leqslant 2$ Condone poor notation e.g. $\int_1^x \frac{1}{4}(3-x)\,\mathrm{d}x$	
	A1*	A fully correct solution with substitution seen or C found leading to $\mathrm{F}(x)=\frac{1}{4}\left(3x-\frac{x^2}{2}\right)-\frac{5}{8}$	
(b)	**M1**	For a correct method for $2<x \leqslant 3$	
	M1	For a correct method for $3<x \leqslant 4$	
	A1	Third line correct including inequality. Allow < instead of $\leqslant$	
	A1	Fourth line correct including inequality. Allow < instead of $\leqslant$	
	B1	First and fifth line correct. Allow "otherwise" for the range on the first or fifth line but not both	
(c)	**M1**	For use of $\mathrm{F}(3.1)-\mathrm{F}(1.2)$ from the correct lines of their F(x) allow ft on their 4th line or correct use of f(x) or area e.g. $\frac{1}{2}\times\frac{7}{10}\times 0.8+1\times\frac{1}{4}+\frac{1}{2}\times\frac{21}{40}\times 0.1$	
	A1	For $\frac{89}{160}$ oe or awrt 0.556 NB: Use of F(3.1) with $\frac{1}{8}(2x-1)$ for $2<x \leqslant 3$ gives 0.555 and scores M0A0	