Question	Scheme	Marks	AOs
4 (a)	$\lim\limits_{\delta x\to 0}\sum\limits_{x=2.1}^{6.3}\frac{2}{x}\delta x=\int_{2.1}^{6.3}\frac{2}{x}\,\mathrm{d}x$	B1	1.2
		(1)	
(b)	$=\left[2\ln x\right]_{2.1}^{6.3}=2\ln 6.3-2\ln 2.1$	M1	1.1b
	$=\ln 9$ CSO	A1	1.1b
		(2)	
			(3 marks)
Notes:			

Mark (a) and (b) as one

(a)

B1: States that $\int_{2.1}^{6.3}\frac{2}{x}\,\mathrm{d}x$ or equivalent such as $2\int_{2.1}^{6.3}x^{-1}\,\mathrm{d}x$ but must include the limits and the dx.

Condone $\mathrm{d}x\leftrightarrow\delta x$ as it is very difficult to tell one from another sometimes

(b)

M1: Know that $\int\frac{1}{x}\mathrm{d}x=\ln x$ and attempts to apply the limits (either way around)

Condone $\int\frac{2}{x}\mathrm{d}x=p\ln x$ (including $p=1$) or $\int\frac{2}{x}\mathrm{d}x=p\ln qx$ as long as the limits are applied.

Also be aware that $\int\frac{2}{x}\mathrm{d}x=\ln x^2$, $\int\frac{2}{x}\mathrm{d}x=2\ln|x|+c$ and $\int\frac{2}{x}\mathrm{d}x=2\ln cx$ o.e. are also correct

$\left[p\ln x\right]_{2.1}^{6.3}=p\ln 6.3-p\ln 2.1$ is sufficient evidence to award this mark

A1: CSO $\ln 9$. Also answer $=\ln 3^2$ so $k=9$ is fine. Condone $\ln|9|$

The method mark must have been awarded. Do not accept answers such as $\ln\frac{39.69}{4.41}$

Note that solutions appearing from "rounded" decimal work when taking lns should not score the final mark. It is a "show that" question

E.g. $\left[2\ln x\right]_{2.1}^{6.3}=2\ln 6.3-2\ln 2.1=2.197=\ln k\Rightarrow k=e^{2.197}=8.998=9$