Question	Scheme	Marks
5(a)	$\frac{1}{2}\times\underline{0.25}\underline{\underline{\left(5.389+6.469+2\left(6.231+6.815+7.028+6.901+6.732\right)\right)}}$	**B1 M1**
	$\left(=\frac{1}{8}\times\left(11.858+2\left(33.707\right)\right)=\frac{1}{8}\times 79.272\right)$	
	= awrt 9.91	**A1**
		(3)
(b)	$\int\sqrt{x}\left(3+\frac{1}{x^2}\right)\mathrm{d}x=\int\left(3x^{\frac{1}{2}}+x^{-\frac{3}{2}}\right)\mathrm{d}x=...x^{\frac{3}{2}}\pm...x^{-\frac{1}{2}}$	**M1**
	$=2x^{\frac{3}{2}}-2x^{-\frac{1}{2}}\ (+c)$	**A1A1**
		(3)
(c)	$\int_3^{4.5}\sqrt{x}\left(3+\frac{1}{x^2}\right)\mathrm{d}x=\left(2(4.5)^{\frac{3}{2}}-2(4.5)^{-\frac{1}{2}}\right)-\left(2(3)^{\frac{3}{2}}-2(3)^{-\frac{1}{2}}\right)=...(8.911...)$ $\Rightarrow$ Area R = "9.909" – "8.911" = ...	**M1**
	= awrt 1.0	**A1**
		(2)
		(8 marks)

Notes:

(a)

B1: For using $h = 0.25$ or equivalent for the width in an attempt at the trapezium rule. Must be used as part of the attempt, not just stated separately.

M1: Correct bracket structure for the trapezium rule.

$$.....\underline{\underline{\left(5.389+6.469+2\left(6.231+6.815+7.028+6.901+6.732\right)\right)}}$$

Look for first + last y values + 2(attempt at sum of remaining values). If one value is missing, allow the M as a slip, but M0 if 1st or last value repeated. Must be y values used.

A1: awrt 9.91

(b)

M1: Expands the brackets and attempts to integrate, look for power increasing by 1 at least once in either a term with power $\frac{1}{2}$ or $-\frac{3}{2}$

A1: One of the two terms correct. Need not be simplified for this mark.

A1: Both terms correct (no need for c). Must be simplified coefficients. Accept equivalents, e.g. $2\left(\sqrt{x^3}-\frac{1}{\sqrt{x}}\right)$ or $2\left(\frac{x^2-1}{\sqrt{x}}\right)$

(c)

M1: Applies limits 3 and 4.5 to their answer to (b) and attempts to subtract the result from the answer to (a).

A1:, awrt 1.0 isw Note: Allow an answer of 9.91 – 8.91 = 1 following correct work.

Question	Scheme	Marks
6(i)	E.g $7^{x+3}=5\Rightarrow(x+3)\log 7=\log 5\Rightarrow x=\dfrac{\log 5}{\log 7}-3$ or $x+3=\log_7 5\Rightarrow x=...$ Alt: $7^{x+3}=5\Rightarrow 7^x=\dfrac{5}{7^3}\Rightarrow x=\log_7\dfrac{5}{343}$	**M1**
	$=-2.17$	**A1**
		(2)
(ii)(a)	$\log_8 64y^3=\log_8 64+\log_8 y^3$ or $\log_8 y^3=3\log_8 y$ or $\log_8 64=2$ Or $\log_8\left(64y^3\right)\Rightarrow\log_8\left(4y\right)^3\Rightarrow 3\log_8\left(4y\right)$ or $\log_8 4=\dfrac{2}{3}$	**M1**
	$18\left(\log_8 y\right)^2+5\log_8\left(64y^3\right)=73\Rightarrow 18\left(\log_8 y\right)^2+5\log_8 64+5\log_8 y^3=73$ $\Rightarrow 18\left(\log_8 y\right)^2+5\times 2+15\log_8 y=73$	**dM1**
	$\Rightarrow 18\left(\log_8 y\right)^2+15\log_8 y-63=0\Rightarrow 6\left(\log_8 y\right)^2+5\log_8 y-21=0$*	**A1***
		(3)
(b)	$\left(2\log_8 y-3\right)\left(3\log_8 y+7\right)=0\Rightarrow\log_8 y=\dfrac{3}{2},-\dfrac{7}{3}\Rightarrow y=8^k$	**M1**
	e.g $y=8^{\frac{3}{2}}$ or $8^{-\frac{7}{3}}$ oe	**A1**
	e.g $16\sqrt{2}$ or $\sqrt{512}$ and $\dfrac{1}{128}$ oe	**A1**
		(3)
		(8 marks)

Notes:

(i)

M1: Correct method for solving to find *x*, e.g. takes logs and rearranges, as shown in scheme. May divide through by 7^3 first or take log to base 7. There must be evidence of correct use of logs.

A1: Correct answer, accept awrt -2.17

(ii)(a)

M1: Attempt the sum or power law of logs on the $\log_8 64y^3$ or applies $\log_8 64=2$ in the proof or

Note this cannot be scored for an attempt at $\left(\log_8 y\right)^2=2\log_8 y$

dM1: Correct use of both the sum and the power law of logs seen or implied on the $\log_8 64y^3$ term and simplifies the $\log_8 64$ to achieve a quadratic in any form.

A1*: Correctly rearranges to the printed equation **with no errors seen** and use of the log laws clear.

(b)

M1: Solves the **given** quadratic and uses a correct method to obtain at least one solution for *y* from an equation of form $\log_8 y=k$. i.e., $\log_8 y=k\Rightarrow y=8^k$. Accept a calculator method to solve the 3TQ.

A1: At least one correct **exact** answer in either exponential or numerical form.

A1: Both correct, accepting any equivalent **exact** forms. ie., exponential or numerical