Question Number	Scheme	Marks
7(i)	$\dfrac{\left(8^x\right)^x}{32^x}=4\Rightarrow\dfrac{2^{3x^2}}{2^{5x}}=2^2\Rightarrow 2^{\left(3x^2-5x\right)}=2^2$	M1A1
	$\Rightarrow 3x^2-5x=2\Rightarrow\left(3x+1\right)\left(x-2\right)=0$	M1
	$x=-\dfrac{1}{3},2$	A1 (4)
(ii)	$\log_x 64-\log_x 4=\log_x\left(\dfrac{64}{4}\right)=\log_x 16$	M1
	$\log_x 16=\dfrac{\log_4 16}{\log_4 x}=\dfrac{2}{\log_4 x}$	M1
	$3\log_4 x+\dfrac{2}{\log_4 x}=5\Rightarrow 3\left(\log_4 x\right)^2+2=5\log_4 x$	M1
	$\Rightarrow 3\left(\log_4 x\right)^2-5\log_4 x+2=0$	
	$\Rightarrow\left(3\log_4 x-2\right)\left(\log_4 x-1\right)=0$	dM1
	$\Rightarrow\log_4 x=\dfrac{2}{3},\log_4 x=1$	A1
	$\Rightarrow x=4^{\frac{2}{3}}\left(=2^{\frac{4}{3}}=\sqrt[3]{16}\right)=2.5198421...\approx 2.52$ or better $\quad x=4^1=4$	dM1A1 (7)
		[11]
ALT (ii)	$\log_x 64-\log_x 4=\log_x\left(\dfrac{64}{4}\right)=\log_x 16=2\log_x 4$	M1
	$\log_4 x=\dfrac{\log_x x}{\log_x 4}=\dfrac{1}{\log_x 4}$	M1
	$2\log_x 4+\dfrac{3}{\log_x 4}=5\Rightarrow 2\left(\log_x 4\right)^2+2=5\log_x 4$	M1
	$\Rightarrow 2\left(\log_x 4\right)^2-5\log_x 4+3=0$	
	$\Rightarrow\left(2\log_x 4-3\right)\left(\log_x 4-1\right)=0$	dM1
	$\Rightarrow\log_x 4=\dfrac{3}{2},\log_x 4=1\Rightarrow 4=x^{\frac{3}{2}},4=x^1$	A1
	$\Rightarrow x=4^{\frac{2}{3}}=\left(\sqrt[3]{16}\right)=2.5198421...\approx 2.52$ or better, $\quad x=4^1=4$	dM1A1 (7)

Question Number	Scheme	Marks
(i)		
M1	Change all terms of equation to powers of 2 (or possibly 4)	
A1	Correct 2 term equation with powers of 2	
M1	Equate the powers in their equation and solve the resulting 3 term quadratic	
A1	Correct values for x (both needed)	
	Special Case: Using factor theorem:	
	Substitute $x = 2$ and show correct M1A1M0A0	
	If (unlikely) same done with $x = -\frac{1}{3}$ - send to Review!	
(ii)		
	The work for the first 3 M marks may appear in a different order.	
	Enter the marks in the order shown here.	
M1	Combine the two logs base x or combine the equivalent logs after changing base. Award for combining the 2 equivalent numbers after multiplying through by their denominators	
M1	Change all logs base x to logs base 4 (or all logs to the same base)	
M1	Obtain a 3 term quadratic, terms in any order.	
dM1	Solve their 3 term quadratic to $\log_4 x = ...$ or $\log_p x = ...$ Depends on all previous M marks	
A1	Two correct values for $\log_4 x$ or $\log_p x$	
dM1	"Undo" their logs to get at least one value for x (not nec correct) Depends on all previous M marks.	
A1	Two correct values for x. Accept accurate answers or min 3 sf	
ALT		
M1	Combine the two logs base x	
M1	Change all log base 4 to log base x	
M1	Obtain a 3 term quadratic, terms in any order.	
dM1	Solve their 3 term quadratic to $\log_x 4 = ...$ or $\log_x p = ...$ Depends on all previous M marks	
A1	Two correct values for $\log_x 4$ or $\log_x p$	
dM1	"Undo" their logs to get at least one value for x Depends on all previous M marks	
A1	Two correct values for x	