Question			Answer	Marks	AOs	Guidance	
11	(a)		The argument is not correct. $x<16$ includes negative values for x for which $x^{\frac{1}{2}}$ does not exist so the statement does not imply that $x^{\frac{1}{2}}<4$.	E1 [1]	2.3	**DR** Allow that x must be positive	Allow the correct solution $0 \le x < 16$ or $0 < x < 16$ without further explanation
11	(b)		EITHER Take logs of both sides $x\log\left(\frac{1}{2}\right)<\log 4$ Giving $x>\frac{\log 4}{\log\left(\frac{1}{2}\right)}$ [since $\log\left(\frac{1}{2}\right)$ is negative] $x>-2$	M1 B1 A1 [3]	2.1 1.1a 2.1	**DR** Use of laws of logs must be seen Allow equivalent with natural logs Award for the boundary value even if only evaluated. Correct inequality.	
			OR Solve $\left(\frac{1}{2}\right)^x=4$ by taking logs base $\frac{1}{2}$ $\log_{\frac{1}{2}}(4)=-2$ Test value – eg when $x=0$ $\left(\frac{1}{2}\right)^0=1<4$ So $x>-2$	M1 B1 A1 [3]		**DR** Using log base $\frac{1}{2}$ Award for the boundary value even if only seen as part of an equation or incorrect inequality Correct inequality.	

Question			Answer	Marks	AOs	Guidance	
11	(c)		Using laws of logs			**DR**	
			$\log_2(x+8)^2 - \log_2(x+6) = 3$	**M1**	**3.1a**	At least one correct use of laws of logs	
			$\log_2 \frac{(x+8)^2}{(x+6)} = 3$				
			$\frac{(x+8)^2}{(x+6)} = 2^3$	**M1**	**3.1a**	Clearing logs to obtain 2^3 or 8 seen in an equation	
			$(x+8)^2 = 8(x+6)$	**A1**	**1.1**	Correct quadratic	
			$x^2 + 8x + 16 = 0$ Discriminant is $8^2 - 4 \times 1 \times 16 = 0$	**M1**	**2.1**	Attempt to find the discriminant of their quadratic (allow one slip)	Allow M1 for an attempt to solve their quadratic
			so there is only one solution	**A1** **[5]**	**2.2a**	Correct argument from zero discriminant or repeated root $x = -4$ found	