Question number	Scheme	Marks
8	$\log_4 a + 2\log_4 b = \frac{5}{2}$	M1
	$\log_4(ab^2) = \frac{5}{2}$	M1
	$32 = ab^2$	A1
	$2^a = \frac{2^{16}}{2^{2b^2}}$	M1
	$a = 16 - 2b^2$ or $b^2 = 8 - \frac{1}{2}a$	A1
	$32 = a(8 - \frac{1}{2}a)$ or $32 = (16 - 2b^2)b^2$	M1
	$a^2 - 16a + 64 = 0$ or $2b^4 - 16b^2 + 32 = 0$	A1
	$a = 8$ $b = 2$	A1
		Total 8 marks

Mark	Guidance
Log equation	**Method 1 – Works in base 4**
M1	For an attempt to change the base of $3\log_8 b$ to base 4 using $\log_a x = \dfrac{\log_b x}{\log_b a}$ $3\log_8 b = \dfrac{3\log_4 b}{\log_4 8} = \dfrac{3\log_4 b}{\frac{3}{2}} = 2\log_4 b$ [accept $p\log_4 b$ where $p \neq 3$]
M1	Uses $n\log A = \log A^n$ **and** $\log A + \log B = \log AB$ to combine the logs correctly $\log_4(ab^2) = \dfrac{5}{2}$ [ft their p provided $p \neq 1$]
A1	For removing the logs in the equation to obtain $32 = ab^2$ o.e. e.g. $a^2b^4 = 1024$
	Method 2 – Works in base 8
M1	For an attempt to change the base of $\log_4 a$ to base 8 using $\log_a x = \dfrac{\log_b x}{\log_b a}$ $\log_4 a = \dfrac{\log_8 a}{\frac{2}{3}} = \dfrac{3\log_8 a}{2}$ [accept $q\log_8 a$ where $q \neq 1$]
M1	Uses $n\log A = \log A^n$ **and** $\log A + \log B = \log AB$ correctly to combine the logs $\log_8(a^{\frac{3}{2}}b^3) = \dfrac{5}{2}$ [ft their q]
A1	For removing the logs in the equation to obtain $a^{\frac{3}{2}}b^3 = 8^{\frac{5}{2}}$ **and** rearranges (raises both sides to the power of $\dfrac{2}{3}$) to obtain $32 = ab^2$
Second equation	
M1	For attempting to change the second equation to powers of 2 or 4: $2^a = \dfrac{2^{16}}{2^{2b^2}} \Rightarrow \left[2^a = 2^{(16-2b^2)}\right]$ or $4^{\frac{a}{2}} = \dfrac{4^8}{4^{b^2}} = \left(4^{\frac{a}{2}} = 4^{8-b^2}\right)$ At least one correct change of term e.g either 2^{16} or 2^{2b^2} OR either $4^{\frac{a}{2}}$ or 4^8
A1	Combines the powers to achieve $a = 16 - 2b^2$ or $\dfrac{a}{2} = 8 - b^2$ oe
Attempt to solve the simultaneous equations	
M1	For an attempt to solve their equations simultaneously, both of which must be in terms of a and b^2, to obtain a 3TQ in either a or b^2. $32 = a(8 - \frac{1}{2}a) \Rightarrow a^2 - 16a + 64 = 0$ or $32 = (16 - 2b^2)b^2 \Rightarrow 2b^4 - 16b^2 + 32 = 0$
M1	For an attempt to solve their 3TQ in either a or b^2 by any method. See General Guidance for the definition of an attempt For example: $a^2 - 16a + 64 = 0 \Rightarrow (a-8)(a-8) = 0 \Rightarrow a = \ldots$ $2b^4 - 16b^2 + 32 = 0 \Rightarrow b^4 - 8b^2 + 16 = 0 \Rightarrow (b^2-4)(b^2-4) = 0 \Rightarrow b = \ldots$
A1	For $a = 8$ and $b = 2$ [If $b = \pm 2$ is given as the final answer, withhold this mark].