Question	Scheme	Marks	AOs
12 (a)	Sets $3\times 2^{2x}=96\sqrt{2}\Rightarrow 2^{2x}=32\sqrt{2}$	M1	1.1b
	$\Rightarrow 2^{2x}=2^5\times 2^{\frac{1}{2}}\Rightarrow 2x=5+\frac{1}{2}$	M1	2.1
	$\Rightarrow x=\frac{11}{4}$	A1	1.1b
		(3)	
(b)	Sets $6^{3-x}=3\times 2^{2x}$ and attempts to take logs with one correct law	M1	2.1
	$(3-x)\log 6=\log 3+2x\log 2$	A1	1.1b
	Takes $\log_2$ and uses $\log_2 6=\log_2 2+\log_2 3$ and $\log_2 2=1$	M1	2.1
	$(3-x)(\log_2 3+1)=\log_2 3+2x$ $\Rightarrow (2+1+\log_2 3)x=3\log_2 3+3-\log_2 3$	ddM1	1.1b
	$x=\frac{3+2\log_2 3}{3+\log_2 3}$ *	A1*	2.1
		(5)	
			(8 marks)

Notes:

(a)

M1: Sets $3\times 2^{2x}=96\sqrt{2}$ and proceeds to make 2^{2x} the subject

M1: Sets both sides as powers of 2 and proceeds to a linear equation in *x*. Alternatively takes logs of both sides and uses appropriate laws to proceeds to a linear equation in *x*

A1: $x=\frac{11}{4}$ or equivalent

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$2^{2x}=32\sqrt{2}\Rightarrow 2x=\log_2 32\sqrt{2}\Rightarrow 2x=\frac{11}{2}$ only scores the first M1 unless clear reasoning is shown to explain the $\frac{11}{2}$. E.g. $2^{2x}=32\sqrt{2}\Rightarrow 2x=\log_2 32\sqrt{2}\Rightarrow 2x=\log_2\left(2^5\times 2^{\frac{1}{2}}\right)\Rightarrow 2x=\log_2\left(2^{\frac{11}{2}}\right)$

(b)

M1: Sets $6^{3-x}=3\times 2^{2x}$ and attempts to take logs with one correct law.

For example $\log 6^{3-x}=3-x\log 6$ would be condoned and allowed as an attempt

A1: For a correct linear equation in *x*. $(3-x)\log 6=\log 3+2x\log 2$

M1: The candidate must be seen to be taking $\log_2$'s and using both $\log_2 6=\log_2 2+\log_2 3$ and $\log_2 2=1$

ddM1: Dependent upon both M's, it is for an attempt to make *x* the subject.

A1*: Proceeds correctly to $x=\frac{3+2\log_2 3}{3+\log_2 3}$ showing correct intermediate steps