

Question number	Scheme	Marks
5 (a)	$\log_4 32 = \frac{\log_2 32}{\log_2 4} = \frac{5}{2}^* \text{ or } \log_4 32 = \log_4 4^{\frac{5}{2}} = \frac{5}{2}^*$ $\text{or } \log_4 32 = \log_{2^2} 2^5 = \frac{5}{2}^*$ <b>ALT</b> $\log_4 32 = a \Rightarrow 4^a = 32 \Rightarrow a = \frac{5}{2}^*$	M1A1cso [2]  {M1}{A1} cso [2]
(b)	$\log_2 x - \log_4 32 + \frac{1}{4} \log_x 16 = 0$ <p>Let <math>\log_2 x = y</math></p> $y - \frac{5}{2} + \frac{1}{4} \left( \frac{\log_2 16}{\log_2 x} \right) = 0 \quad \text{or} \quad y - \frac{5}{2} + \frac{1}{\log_2 x} = 0$ $\Rightarrow y - \frac{5}{2} + \frac{1}{y} = 0$ $\Rightarrow 2y^2 - 5y + 2 = 0$ $\Rightarrow (2y - 1)(y - 2) = 0$ $\Rightarrow y = \log_2 x = \frac{1}{2} \text{ or } 2$ $\Rightarrow x = 2^{\frac{1}{2}} = \sqrt{2} \quad \text{and} \quad x = 2^2 = 4$	M1    M1A1  M1  M1  M1A1 [7]
<b>Total 9 marks</b>		
<b>(a)</b>  <b>M1</b>  <b>ALT</b> <b>M1</b> <b>A1 cso</b> <b>(b)</b> <b>M1</b>  <b>M1</b> <b>A1</b> <b>M1</b>  <b>M1</b>  <b>M1</b> <b>A1</b>	For $\log_4 32 = \frac{\log_2 32}{\log_2 4}$ or $\log_4 32 = \log_4 4^{\frac{5}{2}}$ or $\log_4 32 = \log_{2^2} 2^5$  For $4^a = 32$ Obtains the <b>given</b> answer with no errors in the working  Use of $\log_a x = \frac{\log_b x}{\log_b a}$ or $\log_a b = \frac{1}{\log_b a}$  Forming a 3TQ $2y^2 - 5y + 2 = 0$ Solving the 3TQ For $y = \log_2 x = \frac{1}{2}$ or 2  Either $x = 2^{\frac{1}{2}} = \sqrt{2}$ or $x = 2^2 = 4$ Both $x = 2^{\frac{1}{2}} = \sqrt{2}$ and $x = 2^2 = 4$	