Question	Scheme	Marks	AOs
5 (a)	$2\times 4^x + 2^{x+3} = 1 + 2^{x-2}$		
	Uses an index law and states or implies any of $4^x = p^2$, $2^{x+3} = 8p$ or $2^{x-2} = \frac{p}{4}$	B1	1.1b
	Writes the given equation in terms of p $2\times 4^x + 2^{x+3} = 1 + 2^{x-2} \Rightarrow 2p^2 + 2^3 \times p = 1 + \frac{p}{2^2}$	M1	1.1b
	Proceeds to $8p^2 + 31p - 4 = 0$ via $2p^2 + 8p = 1 + \frac{p}{4}$ *	A1*	2.1
		(3)	
(b)	$8p^2 + 31p - 4 = 0 \Rightarrow (8p-1)(p+4) = 0$	M1	1.1b
	Sets $2^x = \frac{1}{8}, \cancel{-4} \Rightarrow x = ...$	M1	1.1b
	$x = -3$ only cso	A1	2.3
		(3)	
			(6 marks)

Notes:

(a)

B1: Uses an index law and states or implies any of $4^x = p^2$, $2^{x+3} = 8p$ or $2^{x-2} = \frac{p}{4}$

M1: Attempts to write the given equation in terms of p

$2\times 4^x + 2^{x+3} = 1 + 2^{x-2} \Rightarrow 2p^2 + 2^3 \times p = 1 + \frac{p}{2^2}$

Condone slips on signs or the 2^3 if there was an attempt to process.

$2\times 4^x + 2^{x+3} = 1 + 2^{x-2} \Rightarrow 2p^2 + 6p = 1 + \frac{p}{2^2}$ would be fine for the M1

A1*: Proceeds to the given answer of $8p^2 + 31p - 4 = 0$ with no errors or omissions.

An intermediate line of $2p^2 + 8p = 1 + \frac{p}{4}$ o.e. must be seen.

(b)

M1: Valid non calculator attempt at solving $8p^2 + 31p - 4 = 0$

M1: Valid non calculator attempt at solving an equation of the form $2^x = k$, $k > 0$

Allow for this mark $2^x = k \Rightarrow x = \log_2 k$

A1: CSO $x = -3$ only. There should not be any solutions arising from $2^x = -4$