Daily Question

Day 3 Pure Mathematics – Mark Scheme

Question 1

8(i)	Two Ways of answering the question are given in part (i)		
Way 1	$\log_3\left(\frac{3b+1}{a-2}\right) = -1$ or $\log_3\left(\frac{a-2}{3b+1}\right) = 1$	Applying the subtraction law of logarithms	M1
	$\frac{3b+1}{a-2} = 3^{-1}\left\{=\frac{1}{3}\right\}$ or $\left(\frac{a-2}{3b+1}\right) = 3$	Making a correct connection between log base 3 and 3 to a power.	M1
	$\{9b+3 = a-2 \Rightarrow\}\ b = \frac{1}{9}a - \frac{5}{9}$	$b = \frac{1}{9}a - \frac{5}{9}$ or $b = \frac{a-5}{9}$	A1 oe
			[3]

(ii)

$32(2^{2x}) - 7(2^x) = 0$	Deals with power 5 correctly giving ×32	M1
So, $2^x = \frac{7}{32}$	$2^x = \frac{7}{32}$ or $y = \frac{7}{32}$ or awrt 0.219	A1 oe dM1
$x\log 2 = \log\left(\frac{7}{32}\right)$ or $x = \frac{\log\left(\frac{7}{32}\right)}{\log 2}$ or $x = \log_2\left(\frac{7}{32}\right)$	A valid method for solving $2^x = \frac{7}{32}$ Or $2^x = k$ to achieve $x = ...$	
$x = -2.192645...$	awrt -2.19	A1
		[4]

Begins with $2^{2x+5} = 7(2^x)$ (for Way 2 and Way 3) (see notes below)

Question 2

7. (i)	Use of power rule so $(y-1)\log 1.01 = \log 500$ or $(y-1) = \log_{1.01} 500$		M1
	625.56		A1
			(2)
(ii) (a)	Ignore labels (a) and (b) in part ii and mark work as seen		
	$\log_4(3x+5)^2 =$	Applies power law of logarithms	M1
	Uses $\log_4 4 = 1$ or $4^1 = 4$		M1
	Uses quotient or product rule so e.g. $\log(3x+5)^2 = \log 4(3x+8)$ or $\log\frac{(3x+5)^2}{(3x+8)} = 1$		M1
	Obtains with no errors $9x^2 + 18x - 7 = 0$ *		A1* cso
			(4)
(b)	Solves given or "their" quadratic equation by any of the standard methods		M1
	Obtains $x = \frac{1}{3}$ and $-\frac{7}{3}$ and rejects $-\frac{7}{3}$ to give just $\frac{1}{3}$		A1
			(2)
			[8]