Question Number	Please read notes for 8(i) before looking at scheme				Marks
8.(i)	$8^{2x+1}=6\Rightarrow 2x+1=\log_8 6$	M1	$2^{6x+3}=6$		
	$\Rightarrow 2x+1=\dfrac{\log_2 6}{\log_2 8}$	A1	$\Rightarrow (6x+3)\log_2 2=\log_2 6$	M1 A1	
	$\Rightarrow 2x+1=\dfrac{\log_2 2+\log_2 3}{3}$	M1	$\Rightarrow (6x+3)=\log_2 2+\log_2 3$	M1	
	$\Rightarrow x=\dfrac{\log_2 3}{6}-\dfrac{1}{3}$	A1	$\Rightarrow x=\dfrac{\log_2 3}{6}-\dfrac{1}{3}$	A1	**(4)**
(ii)	$\log_5(7-2y)=2\log_5(y+1)-1$		$2\log_5(y+1)-\log_5(7-2y)=1$		
	$\log_5(7-2y)=\log_5(y+1)^2-1$		$\log_5(y+1)^2-\log_5(7-2y)=1$		M1
	$\log_5(7-2y)=\log_5(y+1)^2-\log_5 5$		$\log_5\dfrac{(y+1)^2}{(7-2y)}=1$		dM1
	$(7-2y)=\dfrac{(y+1)^2}{5}$		$\dfrac{(y+1)^2}{(7-2y)}=5$		A1
	$y^2+12y-34=0\Rightarrow y=$		$y^2+12y-34=0\Rightarrow y=$		ddM1
	$y=-6+\sqrt{70}$ oe only				A1
					(5)
					(9 marks)

Notes

There are many different ways to attempt this but essentially can be marked in a similar way.

If index work is used marks are not scored until the log work is seen

Eg 1: $8^{2x+1}=6\Rightarrow 8^{2x}\times 8=6\Rightarrow 8^{2x}=\dfrac{3}{4}$.

1ST M1 is scored for $2x=\log_8\dfrac{3}{4}$ and then 1ST A1 for $2x=\dfrac{\log_2\frac{3}{4}}{\log_2 8}$

but BOTH of these marks would be scored for $2x\log_2 8=\log_2\dfrac{3}{4}$

2nd M1 would then be awarded for $\log_2\dfrac{3}{4}=\log_2 3-\log_2 4$ which may be implied by $\log_2 3-2$

Two more examples where the candidate initially uses index work.

$8^{2x+1}=6\Rightarrow 2^{3(2x+1)}=6$ $3(2x+1)=\log_2 6$ is M1 A1 as it is a correct linear equation in x involving a $\log_2$ term	$8^{2x+1}=6\Rightarrow 64^{x}=\dfrac{3}{4}$ $\Rightarrow x=\log_{64}\dfrac{3}{4}$ is M1 But $\Rightarrow x\log_2 64=\log_2\dfrac{3}{4}$ is M1 A1

Question Number	**Please read notes for 8(i) before looking at scheme**	Marks

(ii)

M1 Attempts a correct log law. This may include

$2\log_5(y+1) \rightarrow \log_5(y+1)^2 \qquad 1 \rightarrow \log_5 5$

You may award this following incorrect work. Eg

$1 = 2\log_5(y+1) - \log_5(7-2y) \Rightarrow 1 = \log_5 2(y+1) - \log_5(7-2y) \Rightarrow 1 = \log_5 \dfrac{2(y+1)}{(7-2y)}$

dM1 Uses two correct log laws. It may not be awarded following errors (see above)

It is awarded for $2\log_5(y+1) - 1 = \log_5 \dfrac{(y+1)^2}{5}$, $2\log_5(y+1) - \log_5(7-2y) = \log_5 \dfrac{(y+1)^2}{(7-2y)}$

$1 + \log_5(7-2y) = \log_5 5(7-2y)$ or $2\log_5(y+1) - 1 = \log_5(y+1)^2 - \log_5 5$

A1 A correct equation in 'y' not involving logs

ddM1 A correct attempt at finding at least one value of y from a 3TQ in y

All previous M's must have been awarded. It can be awarded for decimal answer(s), 2.4 and –14.4

A1 $y = -6 + \sqrt{70}$ or exact equivalent only.

It cannot be the decimal equivalent but award if the candidate chooses 2.4 following the exact answer. If $y = -6 \pm \sqrt{70}$ then the final A mark is withheld

.....

Special case:

Candidates who write

$\log_5(y+1)^2 - \log_5(7-2y) = 1 \Rightarrow \dfrac{\log_5(y+1)^2}{\log_5(7-2y)} = 1 \Rightarrow \dfrac{(y+1)^2}{(7-2y)} = 5$

can score M1 dM0 A0 ddM1 A1 if they find the correct answer.

Question Number	Scheme	Marks
9 (a)	Uses $\tan\theta = \dfrac{\sin\theta}{\cos\theta} \rightarrow$ $\cos\theta - 1 = 4\sin\theta \dfrac{\sin\theta}{\cos\theta}$	M1
	$\cos^2\theta - \cos\theta = 4\sin^2\theta$ oe	A1
	Uses $\sin^2\theta = 1 - \cos^2\theta \rightarrow$ $\cos^2\theta - \cos\theta = 4\left(1 - \cos^2\theta\right)$	M1
	$5\cos^2\theta - \cos\theta - 4 = 0$ *	A1 *
		(4)
(b)	$(5\cos 2x + 4)(\cos 2x - 1) = 0$	M1
	Critical values of $-\dfrac{4}{5}, 1$	A1
	Correct method to find x from their $\cos 2x = -\dfrac{4}{5}$	dM1
	$x = 0, 1.25$	A1
		(4)
		(8 marks)

Notes

(a)

M1 Uses $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ oe in their $\cos\theta - 1 = 4\sin\theta\tan\theta$.

Condone slips in coefficients and the equation may have been adapted.

This may be implied by candidates who multiply by $\cos\theta$ and reach $\cos\theta - 1 = 4\sin\theta\tan\theta \Rightarrow \cos^2\theta - \cos\theta = 4\sin^2\theta$. This would be M1 A1

A1 Correct equation, without any fractional terms, in $\sin\theta$ and $\cos\theta$

If the identity $\sin^2\theta = 1 - \cos^2\theta$ is used before the multiplication by $\cos\theta$ then it will be for a correct equation, without any fractional terms, in $\cos\theta$ Condone incorrect notation $\cos\theta^2$ for $\cos^2\theta$

M1 Uses $\sin^2\theta = 1 - \cos^2\theta$ to produce an equation in just $\cos\theta$

A1* Proceeds to $5\cos^2\theta - \cos\theta - 4 = 0$ with no arithmetical or notational errors. Both identities must be seen to have been applied. Candidates cannot just go from $\cos^2\theta - \cos\theta = 4\sin^2\theta$ to the answer without any evidence of the appropriate identity. No mixed variables within the lines of the "proof"

Condone incomplete lines if it is part of their working.

Eg. $\cos^2\theta - \cos\theta = 4\sin^2\theta$

$= 4\left(1 - \cos^2\theta\right)$

An example of a notational error is $\cos\theta^2$ for $\cos^2\theta$ (Note that this would only lose the A1*)

(b)

M1 Attempts to find the critical values of the given quadratic by a correct method.

A1 Critical values of $-\dfrac{4}{5}, 1$. Allow this to be scored even if written as $\cos x = ...$ or even x.

Allow these to be written down (from a calculator)