Question	Answer	Marks	Guidance
7	Use of $\cot^2\theta + 1 = \text{cosec}^2\theta$ and $\text{cosec}\,\theta = \frac{1}{\sin\theta}$	**B1**	$4 + \cot^2\theta = 9x^2$ gets **B0 M0 A0** unless recovered
	$(3x-2)^2 + 1 = \left(\frac{1}{y}\right)$ oe	**M1**	
	$y = \frac{1}{(3x-2)^2+1}$ oe	**A1**	
	Alternative Method: Use of $\cot\theta = \frac{\cos\theta}{\sin\theta}$ leading to $y = \frac{\cos^2\theta}{(3x-2)^2}$ oe	**M1**	For use of the identity to substitute $\cot\theta$ to get $2 + \frac{\cos\theta}{\sqrt{y}} = 3x$ **and** rearranging to get $y = \frac{\cos^2\theta}{(3x-2)^2}$
	Use $\sin^2\theta + \cos^2\theta = 1$ to get $y = \frac{1-y}{(3x-2)^2}$ oe	**M1**	For use of the identity to substitute $\cos^2\theta$ to get $y = \frac{1-\sin^2\theta}{(3x-2)^2}$ **and** use of $\sin^2\theta = y$
	$y = \frac{1}{(3x-2)^2+1}$ oe	**A1**	
8	$\sin\left(2\alpha - \frac{\pi}{3}\right) = (\pm)\frac{1}{2}$	**B1**	Condone if ± is missing for this mark
	$\alpha = -\frac{5\pi}{12}, -\frac{\pi}{4}, \frac{\pi}{12}, \frac{\pi}{4}$ oe in terms of π	**4**	**M1** for correct attempt to obtain one solution using correct order of operations **A3** for 4 correct solutions and no extras in the range, or **A2** for 3 correct solutions or **A1** for 2 correct solutions
9(a)	For use of $e^0 = 1$ or $\ln 1 = 0$	**B1**	
	$4x - y\,(=0)$	**B1**	For simplifying powers of e leading to a linear equation in x and y
	$4x^3 = 256$ or $\frac{y^3}{16} = 256$	**M1**	For attempt to obtain a cubic equation in one variable using *their* linear $4x - y = 0$ with an attempt to solve
	$x = 4,\ y = 16$	**2**	**A1** for each **A0** for $y = \pm 16$

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Question	Answer	Marks	Guidance
9(b)	$e^{1-2x} = \frac{1}{e^{2x-1}}$	**B1**	Correct use of the reciprocal
	$10\left(e^{2x-1}\right)^2 - 11e^{2x-1} - 6 = 0$ or $6\left(e^{1-2x}\right)^2 + 11e^{1-2x} - 10 = 0$	**M1**	For a correct attempt to form a quadratic equation in e^{2x-1} or in e^{1-2x}
	$e^{2x-1} = \frac{3}{2}$ $\left(e^{2x-1} = -\frac{2}{5}\right)$ or $e^{1-2x} = \frac{2}{3}$ $\left(e^{1-2x} = -\frac{5}{2}\right)$	**M1**	**Dep** on attempt to solve *their* quadratic equation
	$x = \frac{1}{2} + \frac{1}{2}\ln\frac{3}{2}$ or exact equivalent only	**A1**	Allow $x = \frac{1+\ln\frac{3}{2}}{2}$ and $x = \frac{1}{2}\ln(\frac{3}{2}e)$ for **A1** **A0** if negative root not discounted
	Alternative Method: $\frac{10e^{2x}}{e} - 11 = \frac{6e}{e^{2x}}$	**B1**	Correct use of the reciprocal
	$10(e^{2x})^2 - 11e(e^{2x}) - 6e^2 = 0$	**M1**	For correct attempt to form a quadratic equation
	$e^{2x} = \frac{11e \pm 19e}{20}$	**M1**	**Dep** on attempt to solve *their* quadratic equation
	$x = \frac{1}{2}\ln(\frac{3}{2}e)\left[= \frac{1}{2}\ln\frac{3}{2} + \frac{1}{2}\right]$	**A1**	Allow $x = \frac{1+\ln\frac{3}{2}}{2}$ and $x = \frac{1}{2}\ln(\frac{3}{2}e)$ for **A1** **A0** if negative root not discounted
10(a)	$t = \frac{\pi}{2}$	**2**	**M1** for attempt at solution of $3\sin 2t = 0$ implied by 90 or $\frac{\pi}{2}$ **A0** for $t = 90$
10(b)	$-\frac{3}{2}\cos 2t$	**2**	**M1** for $k\cos 2t,\ k \neq 6$
	When $t = 0$, $s = 0$ so $c = \frac{3}{2}$	**M1**	**Dep** on attempt to find c using *their* s
	$s = \frac{3}{2} - \frac{3}{2}\cos 2t$	**A1**	Must be an expression for s

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