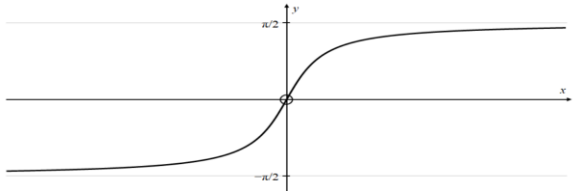
Question			Answer	Marks	AO	Guidance	
3	(a)			**B1** **B1** **[2]**	**1.1b** **1.1b**	General shape with horizontal asymptotes Allow if asymptote not drawn provided the intention is clear Must be a one-to-one function y-values $\pm\frac{\pi}{2}$ seen	
3	(b)		**DR** Graphs intersect when $3\sin x\cos x = \cos^2 x$ Either $\cos x = 0$ giving $x = -\frac{\pi}{2}, \frac{\pi}{2}$ or $3\sin x = \cos x$ giving $\tan x = \frac{1}{3}$ $x = 0.322$, $x = -2.82$ to 3s.f. When $x = 0.322$ or $x = -2.82$ $y = 0.9$ [So the points of intersection are $(0.322, 0.9), (-2.82, 0.9)\left(-\frac{\pi}{2}, 0\right), \left(\frac{\pi}{2}, 0\right)$] **[6]**	**M1** **M1** **A1** **M1** **A1** **A1**	**1.1a** **1.1b** **2.1** **2.1** **2.1** **2.1**	soi Attempt to solve $\cos x = 0$ Both values in radians needed Both values in radians to at least 2 s.f. needed. Do not award if additional values inside the interval $[-\pi, \pi]$ Ignore additional values outside the interval $[-\pi, \pi]$. Allow awrt 0.90	Allow for $x = \tan^{-1}\frac{1}{3}$ SC1 award for 18.4° and -161.6° if 90° already seen Notice 0.9 is exact.

			Alternative method				
			DR				
			Graphs intersect when $3\sin x\cos x = \cos^2 x$	**M1**		soi	
			Either $\cos x = 0$	**M1**	**1.1b**	Attempt to solve $\cos x = 0$	
			giving $x = -\frac{\pi}{2}, \frac{\pi}{2}$	**A1**	**2.1**	Both values in radians needed	
			Or $3\sin x = \cos x$				
			Squaring gives				
			$9\sin^2 x = \cos^2 x = 1 - \sin^2 x$				
			$10\sin^2 x = 1$				
			$\sin x = \pm\sqrt{0.1}$	**M1**		Complete method for finding at least one value for $\sin x$	
			$x = -2.820, -0.322, 0.322, 2.820$				
			Select genuine roots 0.322, -2.820	**A1**		Both correct roots and no others in the range	
			When $x = 0.322$ or $x = -2.82$ $y = 0.9$	**A1**	**2.1**	Allow awrt 0.90	Notice 0.9 is exact.
			[So the points of intersection are $\left(-\frac{\pi}{2}, 0\right), \left(\frac{\pi}{2}, 0\right), (0.322, 0.9), (-2.820, 0.9)$]				
				[6]			