7	**(a)**		**DR** $m\sec\theta+3\cos\theta=4\sin\theta$ $\left(\Rightarrow m\sec\theta+\dfrac{3}{\sec\theta}=4\sin\theta\right)$ $m\sec^2\theta+3=4\sin\theta\sec\theta$	**M1**	**2.1**	Or for $m\sec\theta+3\cos\theta=4\sin\theta$ $\left(\Rightarrow \dfrac{m\sec\theta}{\cos\theta}+3=4\dfrac{\sin\theta}{\cos\theta}\right)$ $m\sec^2\theta+3=4\tan\theta$ The first **M** mark is for a valid method arriving at a three term equation containing $\sec^2\theta$	**Squaring each individual term of the original equation scores no marks**
			$m\left(1+\tan^2\theta\right)+3=4\tan\theta$	**M1**	**1.1**	Correctly uses the identity $1+\tan^2\theta\equiv\sec^2\theta$ to obtain an equation in $\tan\theta$ only	
			$m+m\tan^2\theta+3=4\tan\theta$ $\Rightarrow m\tan^2\theta-4\tan\theta+(m+3)=0$	**A1**	**2.2a**	**AG** so sufficient working must be shown	**A0** if angle missing from any trigonometric terms
				[3]			

7	(b)		**DR**				
			$\Delta=(-4)^2-4m(m+3)$	**M1***	**3.1a**	Considers discriminant of given quadratic equation in tan (*c* must be two terms) to get an expression in *m* only. **M0** for embedded discriminant in quadratic formula unless explicitly considered	Allow $4^2-4m(m+3)$
			As the quadratic equation in tan has only one solution for θ in the given interval (and as the range of tan in the given interval is all non-zero real values) this implies that the given equation must only have one real root and therefore $(-4)^2-4m(m+3)=0 \Rightarrow m^2+3m-4=0$	**M1dep***	**1.1**	Sets their discriminant equal to zero and obtains an expanded three-term quadratic in *m*	**Reasoning for setting the discriminant equal to zero is not required for this mark**
			$(m+4)(m-1)=0 \Rightarrow m=-4$ only as *m* is a negative integer	**A1**	**1.1**	State or imply $m=-4$ **only**	
			$m=-4 \Rightarrow (2\tan\theta+1)^2=0$ so $\tan\theta=-0.5$	**M1**	**1.1**	Uses their negative integer value of *m*, and solves the equivalent of their three term quadratic equation in tan, to obtain (at least) $\tan\theta=k$ **- dependent on both previous M marks** Allow $-4\tan^2\theta-4\tan\theta-1=0$ $\Rightarrow \tan\theta=-0.5$ for this mark	where *k* is non-zero. **If no method shown for solving their quadratic, then award this mark if the solution is correct for their quadratic**
			$\theta=2.68$ (3 sf)	**A1** **[5]**	**2.4**	For full marks must explain why the discriminant should be set equal to zero – must say that as there is only one value of θ or tan $\theta \Rightarrow \Delta=0$ (as a minimum must see explicit mention of 'one' together with 'θ' or 'tanθ' for this mark). Allow awrt 2.68	2.677945045...