

Q	Marking Instructions	AO	Marks	Typical Solution
8(a)	Uses $A = \frac{1}{2}ab \sin C$ for triangle OAC or OAB PI by equation	AO1.2	B1	$\frac{1}{2}r \times \frac{r}{2} \sin \theta = \frac{1}{4} \left(\frac{1}{2}r^2 \theta \right)$ $\Rightarrow \frac{r^2}{4} \sin \theta = \frac{1}{8}r^2 \theta$ $\Rightarrow 2r^2 \sin \theta = r^2 \theta$ $\Rightarrow 2 \sin \theta = \theta$ AG
	Forms an equation relating the area of OAC and ABC in the form $Ar^2 \sin \theta = Br^2 \theta$	AO3.1a	M1	
	Obtains fully correct equation ACF	AO1.1b	A1	
	Simplifies to obtain required equation, only award if all working correct with rigorous argument.	AO2.1	R1	
(b)	Rearranges to the form $f(\theta) = 0$ PI by correct θ_2 or θ_3	AO1.1a	M1	$f(\theta) = \theta - 2 \sin \theta = 0$ $\theta_{n+1} = \theta_n - \frac{\theta_n - 2 \sin \theta_n}{1 - 2 \cos \theta_n}$ $\theta_2 = 2.094395\dots$ $\theta_3 = 1.913222\dots$ $\theta_3 = 1.91322 \text{ (5 d.p.)}$
	Differentiates their $f(\theta)$ or uses calculator PI correct θ_2 or θ_3	AO1.1b	A1	
	Obtains correct θ_3	AO1.1b	A1	
(c)	Obtains percentage error for θ_3 AWRT 0.94%	AO3.2b	B1	0.935%
Total			8	