Question	Answer	Marks	Guidance
(a)	Sector area = $\frac{1}{2}r^2\left(\frac{\pi}{6}\right)\left[=\frac{\pi}{12}r^2\right]$	**B1**	Using $\frac{1}{2}r^2\theta$ with θ in radians SOI. B0 if using a value for r.
	$BD = \sin\frac{\pi}{6}r\left[=\frac{1}{2}r\right]$ and $AD = \cos\frac{\pi}{6}\mathrm{r}\left[=\frac{\sqrt{3}}{2}r\right]$ so triangle area = $\frac{1}{2}\left(\sin\frac{\pi}{6}r\right)\left(\cos\frac{\pi}{6}\mathrm{r}\right)\left[=\frac{1}{2}\times\frac{1}{2}r\times\frac{\sqrt{3}}{2}r\right]$ **or** $\frac{1}{2}r\left(\cos\frac{\pi}{6}r\right)\left(\sin\frac{\pi}{6}\right)\left[=\frac{1}{2}r\times\frac{\sqrt{3}}{2}r\times\frac{1}{2}\right]$	**B1**	SOI Finding triangle area. Decimals B0 unless exact values seen in working.
	Area of $BCD = \frac{1}{12}\pi r^2 - \frac{\sqrt{3}}{8}r^2$	**B1**	OE e.g. $\frac{r^2}{4}\left(\frac{\pi}{3}-\frac{\sqrt{3}}{2}\right)$ with $\cos\frac{\pi}{6}$ and $\sin\frac{\pi}{6}$ evaluated. Must be exact, in terms of r^2. ISW
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Question	Answer	Marks	Guidance
(b)	Angle $BAC = \sin^{-1}\left(\frac{\frac{\sqrt{3}}{2}r}{r}\right)\left[=\frac{\pi}{3}\right]$	**B1**	SOI by length of AD, CD or arc, or by perimeter.
	Length $AD = \cos\frac{\pi}{3}r\left[=\frac{1}{2}r\right]$ [so length $CD = \frac{1}{2}r$]	**M1**	SOI Finding length by Pythagoras, or by trigonometry with *their* angle BAC, provided $BAC \neq \frac{\pi}{6}$.
	Length of arc $BC = r \times \frac{\pi}{3}$	**M1**	SOI Using $r\theta$ with θ in radians. Condone $\theta = \frac{\pi}{6}$.
	Perimeter of $BCD = \frac{\sqrt{3}}{2}r + \frac{1}{2}r + \frac{\pi}{3}r$	**A1**	OE e.g. $r\left(\frac{\sqrt{3}+1}{2}+\frac{\pi}{3}\right)$ with e.g. $\cos\frac{\pi}{3}$ evaluated. Must be exact, in terms of r. ISW
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