5	**(a)**		$x^2+y^2=4$	**B1**	**1.1**	soi	
			When $x=1$ $1+y^2=4\Rightarrow y=\sqrt{3}$	**E1**	**2.1**	AG Check that Q lies on the circle	**OR** **B1** $x^2+\left(\sqrt{3}\right)^2=4\Rightarrow x=1$
			$y=\frac{1}{\sqrt{3}}(4-1)\Rightarrow y=\sqrt{3}$	**E1**	**2.1**	AG Check that Q lies on the parabola	**B1** $\sqrt{3}=\frac{1}{\sqrt{3}}\left(4-x^2\right)\Rightarrow x=1$
				[3]			

Question			Answer	Marks	AO	Guidance	
5	(b)		$\frac{1}{\sqrt{3}}\int_{-1}^{1}\left(4-x^2\right)\mathrm{d}x$	**M1**	**3.1a**	Attempt correct integral and limits; may be implied by answer 4.23(39…)	**OR M1** $\frac{1}{\sqrt{3}}\int_{0}^{1}\left(4-x^2\right)\mathrm{d}x =$ 2.1169…
			$=\frac{22\sqrt{3}}{9}$	**A1**	**1.1**	BC	**A1** $=\frac{11\sqrt{3}}{9}$
			Let N be the point $(1, 0)$	**B1**	**2.1**		**OR**
			Area $OQN = \frac{\sqrt{3}}{2}$ oe or 0.866 (3 s.f.)				**B1** semi-circle: $y=\sqrt{4-x^2}$
			$QON = \tan^{-1}\sqrt{3}$	**M1**	**3.1a**	Or $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ or $\cos^{-1}\left(\frac{1}{2}\right)$ or $\frac{1}{3}\pi$ or 60°	**M1** attempt $\int_{-1}^{1}\sqrt{4-x^2}\mathrm{d}x$ by substitution, e.g. $x=2\sin u$
			$POQ = \frac{1}{3}\pi$ or 60°	**A1**	**1.1**	**M1A1** may be implied by seeing next line	**M1** Use trigonometric identity e.g. $\int_{-\frac{1}{6}\pi}^{\frac{1}{6}\pi} 4\cos^2 u\,\mathrm{d}u = \int_{-\frac{1}{6}\pi}^{\frac{1}{6}\pi} a\cos 2u + b\,\mathrm{d}u$
			Area sector $POQ = \frac{1}{2}\times 2^2 \times \frac{1}{3}\pi$ oe $(=\frac{2}{3}\pi$ oe or 2.09 (3 s.f.))	**M1**	**1.1**	FT their angle POQ	**A1** $\frac{2}{3}\pi+\sqrt{3}$
			Shaded area $=\frac{22\sqrt{3}}{9}-2\times\frac{\sqrt{3}}{2}-\frac{2}{3}\pi$ oe	**M1**	**3.2a**	Correct combination of their areas	**M1** Shaded area $=\frac{22\sqrt{3}}{9}-\frac{2}{3}\pi-\sqrt{3}$ oe
			$=\frac{13\sqrt{3}}{9}-\frac{2}{3}\pi$ oe	**A1**	**1.1**		**A1** $=\frac{13\sqrt{3}}{9}-\frac{2}{3}\pi$ oe
				[8]			