

$$r = \theta^2, \quad 0 \leq \theta \leq \frac{\pi}{6}.$$

$$A = \int_0^{\pi/6} \frac{1}{2} r^2 d\theta = \int_0^{\pi/6} \frac{1}{2} (\theta^2)^2 d\theta = \int_0^{\pi/6} \frac{1}{2} \theta^4 d\theta = \left[\frac{1}{2 \cdot 5} \theta^5 \right]_0^{\pi/6} = \frac{1}{2 \cdot 5} \left(\frac{\pi}{6} \right)^5 = \frac{1}{77,760} \pi^5$$