



In polar coordinates, the equation for the circle becomes

$$x^2 + y^2 - 6x = 0$$

$$r^2 \cos^2(\theta) + r^2 \sin^2(\theta) - 6r \cos(\theta) = 0$$

$$r^2 [\cos^2(\theta) + \sin^2(\theta)] - 6r \cos(\theta) = 0$$

$$r^2 - 6r \cos(\theta) = 0$$

$$r = 6 \cos(\theta)$$

$$A = \int_{-\pi/2}^{\pi/2} \int_0^{6 \cos(\theta)} r \, dr \, d\theta$$

$$= \int_{-\pi/2}^{\pi/2} \left[\frac{1}{2} r^2 \right]_{r=0}^{r=6 \cos(\theta)} d\theta$$

$$= \frac{1}{2} \int_{-\pi/2}^{\pi/2} [36 \cos^2(\theta) - 0] d\theta$$

$$= 18 \int_{-\pi/2}^{\pi/2} \cos^2(\theta) d\theta$$

$$= 18 \int_{-\pi/2}^{\pi/2} \frac{1 + \cos(2\theta)}{2} d\theta$$

$$= 9 \left[\theta + \frac{1}{2} \sin(2\theta) \right]_{-\pi/2}^{\pi/2}$$

$$= 9 \left[\frac{\pi}{2} + \frac{\pi}{2} \right]$$

$$\boxed{= 9\pi}$$