$r = 8\sin\theta \quad \Rightarrow \quad x = r\cos\theta = 8\sin\theta\cos\theta = \frac{8}{2}\sin 2\theta,\ y = r\sin\theta = 8\sin^2\theta$
$\Rightarrow$

$$\frac{dy}{dx} = \frac{dy/d\theta}{dx/d\theta} = \frac{8\cdot 2\sin\theta\ \cos\theta}{4\cdot 2\cos 2\theta} = \frac{\sin 2\theta}{\cos 2\theta} = \tan 2\theta$$

When $\theta = \frac{\pi}{6}$, $\frac{dy}{dx} = \tan\left(2\cdot\frac{\pi}{6}\right) = \tan\frac{\pi}{3} = \sqrt{3}$.