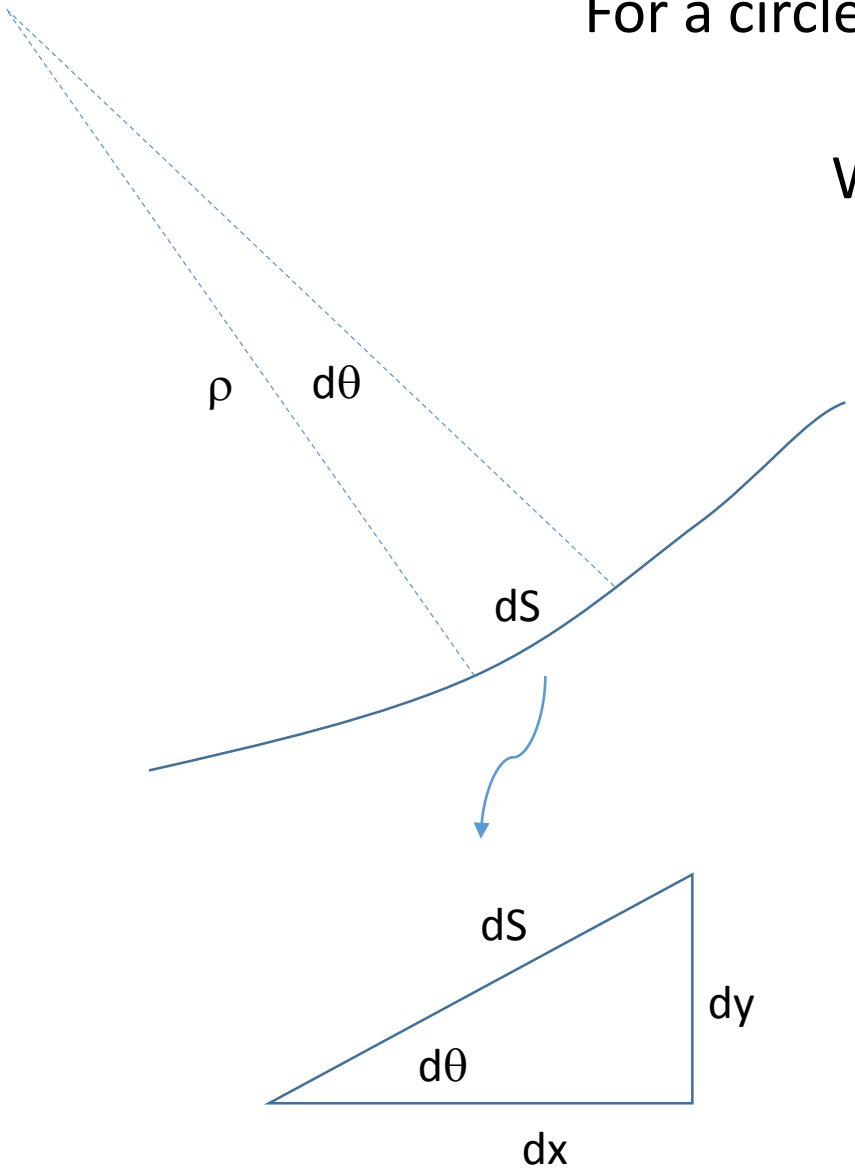
For a circle $S = \rho\theta$ Or $\rho = S/\theta$ For an arc $\rho = dS/d\theta$



We already saw $dS = dx\sqrt{1 + \left({}^{dy}/_{dx}\right)^2}$

$$\rho = \frac{dx}{d\theta}\sqrt{1 + \left({}^{dy}/_{dx}\right)^2}$$

What is *dx/dθ*?
Well it is 1 / *dθ/dx* !

Recall $tan\theta = \frac{dy}{dx}$ So $\theta = arctan\left(\frac{dy}{dx}\right)$

$$\frac{d\theta}{dx} = \frac{1}{1 + \left({}^{dy}/_{dx}\right)^2}\frac{d}{dx}\left(\frac{dy}{dx}\right) = \frac{1}{1 + \left({}^{dy}/_{dx}\right)^2}\frac{d^2y}{dx^2}$$

Finally $$\rho = \frac{\left[1 + \left({}^{dy}/_{dx}\right)^2\right]^{3/2}}{\frac{d^2y}{dx^2}}$$