



$$\theta = \tan^{-1} \frac{y}{x}$$

$$r^2 + y^2 - 2\sqrt{x^2 + y^2} r \cos \theta = 0$$

$$d^2 = (\sqrt{x^2 + y^2})^2 + r^2 - 2\sqrt{x^2 + y^2} r \cos \theta$$

$$r = \frac{x^2 + y^2}{2\sqrt{x^2 + y^2} \cos \theta}$$

$$r^2 = x^2 + y^2 + r^2 - 2\sqrt{x^2 + y^2} r \cos \theta$$

$$r_{\text{short}} = r \cdot \frac{d}{2}$$

$$U_{\text{short}} = U_{\text{long}} r_{\text{short}}$$

$$r_{\text{long}} = r + \frac{d}{2}$$

$$V_{\text{long}} = U_{\text{long}} r_{\text{long}}$$

$$L = \frac{\theta}{360} 2\pi r \quad L_{\text{long}} = \frac{\theta}{360} 2\pi r_{\text{long}}$$

$$L_{\text{short}} = \frac{\theta}{360} 2\pi r_{\text{short}}$$

† seconds to arrive destination

$$V_{s/L} = \frac{L_{s/L}}{t} = \frac{U_{s/L}}{t} = \frac{\frac{\theta}{360} 2\pi r_{s/L}}{t} = \frac{\theta 2\pi}{360 t} r_{s/L}$$