

HW 12-1

$$\text{Circum} = 400\text{m}$$

Leona 1 lap 1.2 min.

Fred 1 lap 1.8 min

time to lap

$$\omega_{\text{Leona}} = \frac{2\pi}{1.2 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ s}} = .0873 \frac{\text{rad}}{\text{s}}$$

Leona's speed

Leona's acc.

Leona's angular acc.

$$\omega_{\text{Fred}} = \frac{2\pi}{1.8 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ s}} = .0582 \frac{\text{rad}}{\text{s}}$$

$$\theta_{\text{Leona}} = \omega_{\text{Leona}} t$$

$$\theta_{\text{Fred}} = \omega_{\text{Fred}} t$$

$$\text{Leona 1 more lap } \theta_{\text{Leona}} = \theta_{\text{Fred}} + 2\pi$$

$$.0873 t = .0582 t + 2\pi$$

$$t = \frac{2\pi}{.0873 - .0582} = \underline{216 \text{ s}}$$

$$v_{\text{Leona}} = r \omega_{\text{Leona}}$$

$$2\pi r = 400$$

$$r = 63.66 \text{ m}$$

$$v_{\text{Leona}} = (63.66)(.0873)$$

$$\underline{5.56 \text{ m/s}}$$

$$a_{\text{Leona}} = a_{\text{cent.}} = \frac{v^2}{r} = \frac{(5.56)^2}{63.66} = .486 \text{ m/s}^2$$

$$\alpha = \frac{d\omega}{dt} = 0 \text{ because } \omega \text{ constant}$$