

Quick Lab angular momentum

Ratio of I_{wheel} to I_{student} .

$$\frac{I_{\text{wheel}}}{I_{\text{student}}}$$

$$L_0 = L_{\text{wheel}_0} + L_{\text{student}_0} \quad L_f = L_{\text{wheel}_f} + L_{\text{student}_f}$$

$L_0 = L_f$ Law of conservation of angular momentum

$$L_{w_0} = L_{w_f} + L_{s_f} \rightarrow I_w \omega_{w_0} = I_w \omega_{w_f} + I_s \omega_{s_f}$$

$$I_w \omega_{w_0} - I_w \omega_{w_f} = I_s \omega_{s_f} \rightarrow I_w (\omega_{w_0} - \omega_{w_f}) = I_s \omega_{s_f}$$

$$\frac{I_w}{I_s} = \frac{\omega_{s_f}}{(\omega_{w_0} - \omega_{w_f})}$$

$$= \frac{-0.421 \frac{\text{rev}}{\text{sec}}}{-3 \frac{\text{rev}}{\text{sec}} - 2.82 \frac{\text{rev}}{\text{s}}} = 0.072$$

wheel has 7.2% the moment of inertia of the student

$$W_{wo} = ?$$

frame 95 - 80
frame 175 -

80 frame

$$\frac{80}{240 \text{ fps}} = 0.333 \text{ sec}$$

1 rev

$$\frac{1 \text{ rev}}{0.333 \text{ sec}}$$

CW

$$W_{wo} = -3 \text{ rev/sec}$$

$$W_{wf} = ?$$

frame 1064 - 85
frame 1149 -

85 frames

$$\frac{85 \text{ frames}}{240 \text{ fps}} = 0.354 \text{ sec}$$

$$\frac{1 \text{ rev}}{.354}$$

$$W_{wf} = 2.82 \text{ rev/sec}$$

$$W_{sf}$$

frame 1027 - 570 frames
frame 1597 -

$$\frac{570}{240 \text{ fps}} =$$

$$2.375 \text{ sec}$$

$$\frac{1 \text{ rev}}{2.375}$$

$$W_{sf} = -0.421 \text{ rev/sec}$$