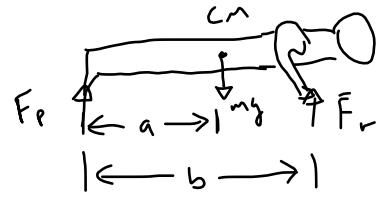
ETA problem 10.8.4



(a) Constant speed, $\Sigma \vec{\tau} = 0$

Take sum of torques around pivot point (toes)

$2bF_r - amg = 0$

$F_r = \frac{a}{2b} mg$

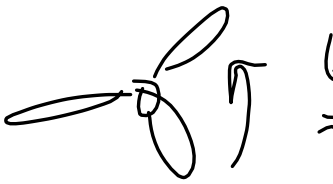
Note also, that $\Sigma F_y = 0$, $F_p + 2F_r - mg = 0$

$F_p = mg - 2F_r = mg\left(1 - \frac{a}{b}\right)$

As $a \to b$, $F_p \to 0$, $F_r \to \frac{mg}{2}$

Nov 2-9:40 AM

Check your understanding 10.4



6 rad/s

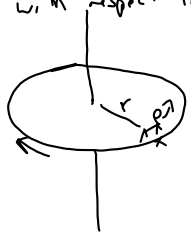
$\vec{\tau} = 5 \times 10^5 \text{ N} \cdot \text{m}$ out of page

$P = \tau \omega = (5 \times 10^5 \text{ N} \cdot \text{m})(6 \text{ s}^{-1})$

$= 3 \times 10^6 \frac{\text{N} \cdot \text{m}}{\text{s}} = 3 \text{ MW}$

Nov 2-10:09 AM

A 17-kg dog is standing at the edge of a stationary, frictionless turntable with $I = 95\ kg \cdot m^2$ and radius of 1.8 m. The dog walks once around the turntable. What fraction of a full circle does the dog's motion make with respect to the ground?



$L_i = L_f = 0$

Let

$\Delta\theta_D$ = dog's angular displacement

$\Delta\theta_T$ = turntable "

$$0 = I_D\omega_D + I_T\omega_T$$

$$= I_D\left(\frac{\Delta\theta_D}{\Delta t}\right) + I_T\left(\frac{\Delta\theta_T}{\Delta t}\right)$$

$I_T = 95\ kg \cdot m^2$

$I_D = m_D r^2 = 56\ kg \cdot m^2$

Nov 2-10:37 AM

Key piece of info:

$\Delta\theta_D + |\Delta\theta_T| = 2\pi$, then with algebra

$$\frac{\Delta\theta_D}{2\pi} = \frac{I_T}{I_D + I_T}$$

(here, dog walks about 63% around full circle)

Nov 2-10:43 AM