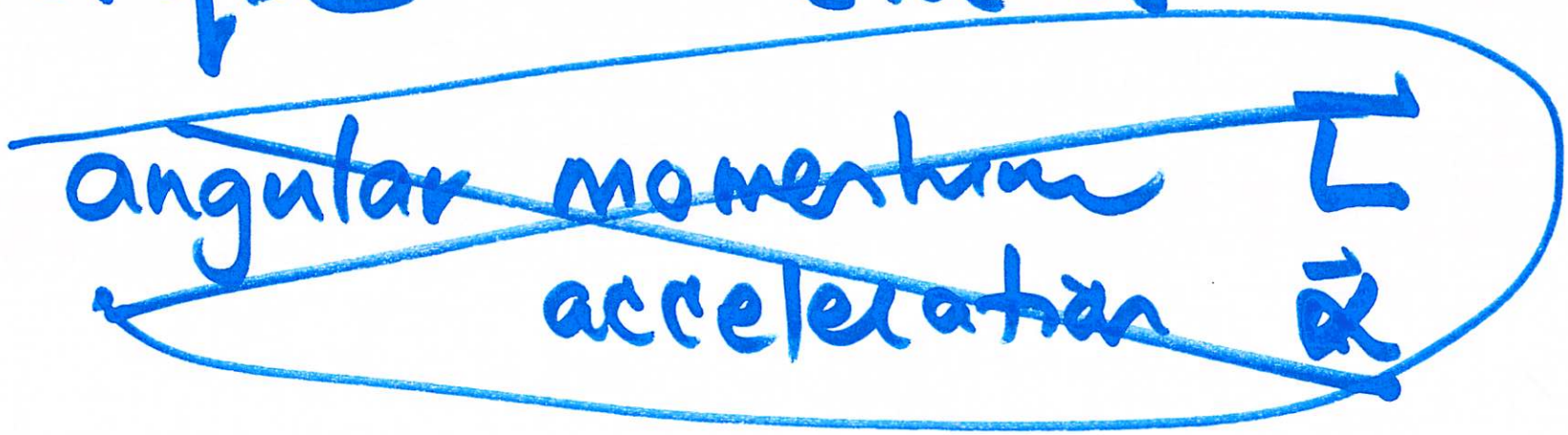
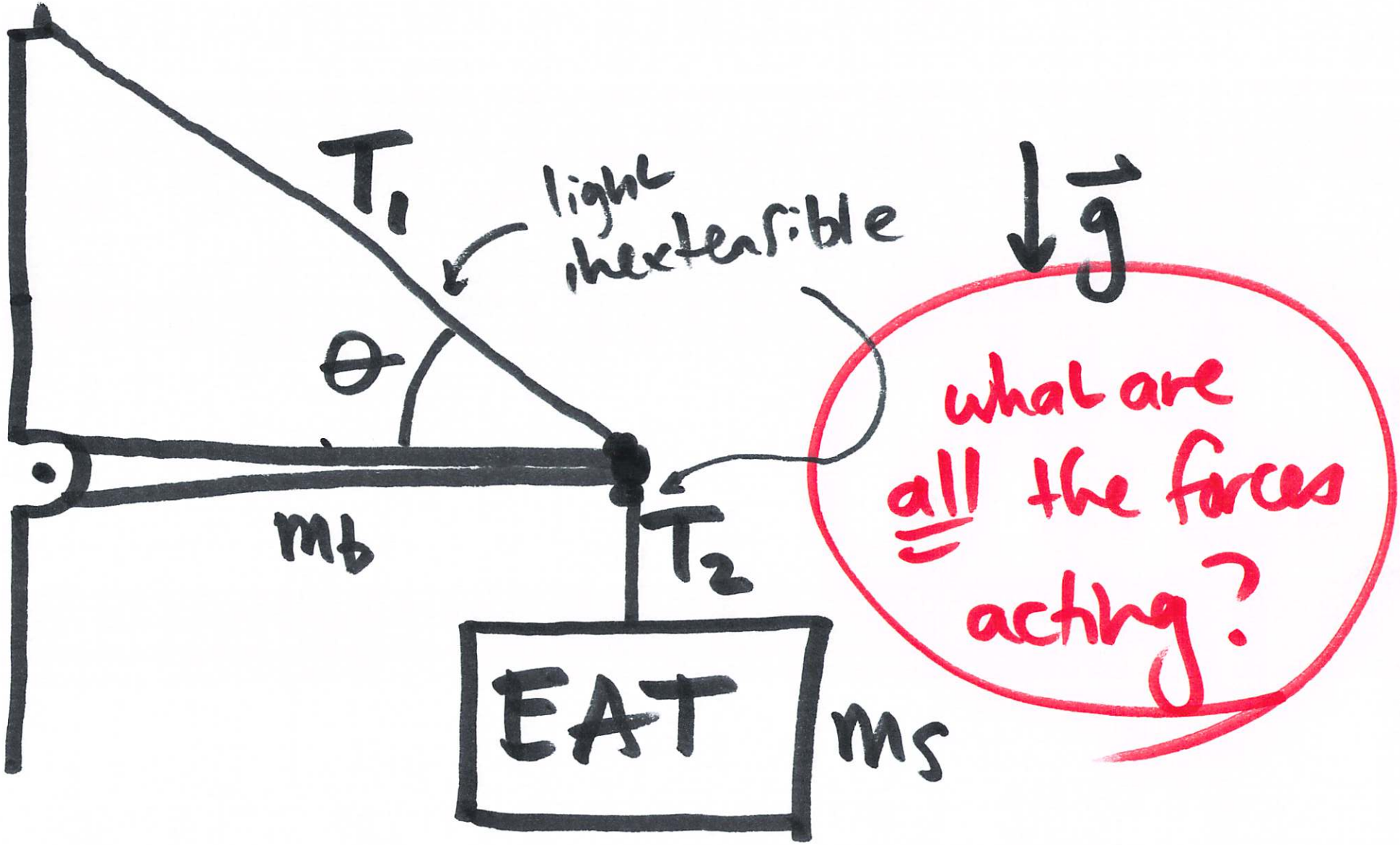
2013-10-29

- torque → statics

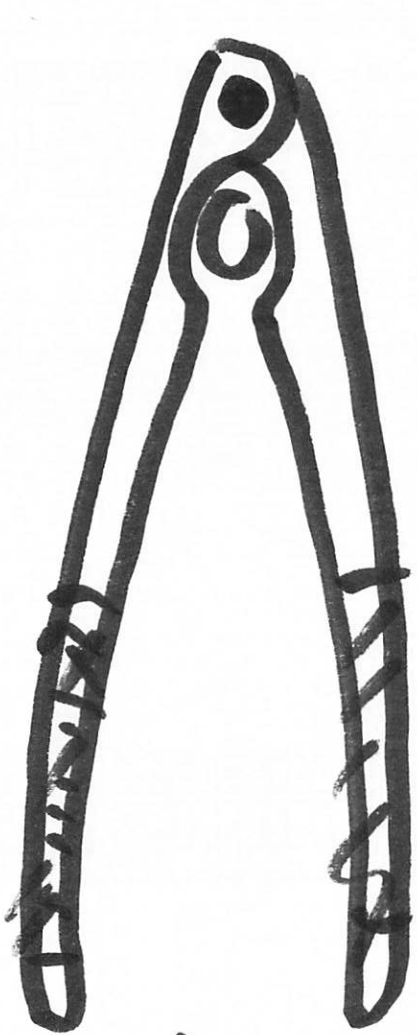


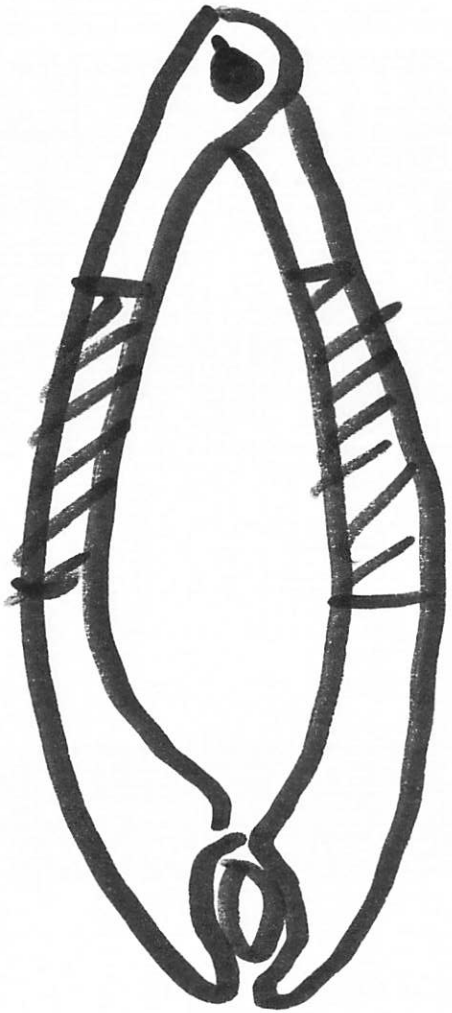
- harmonic oscillators

(Young's modulus)



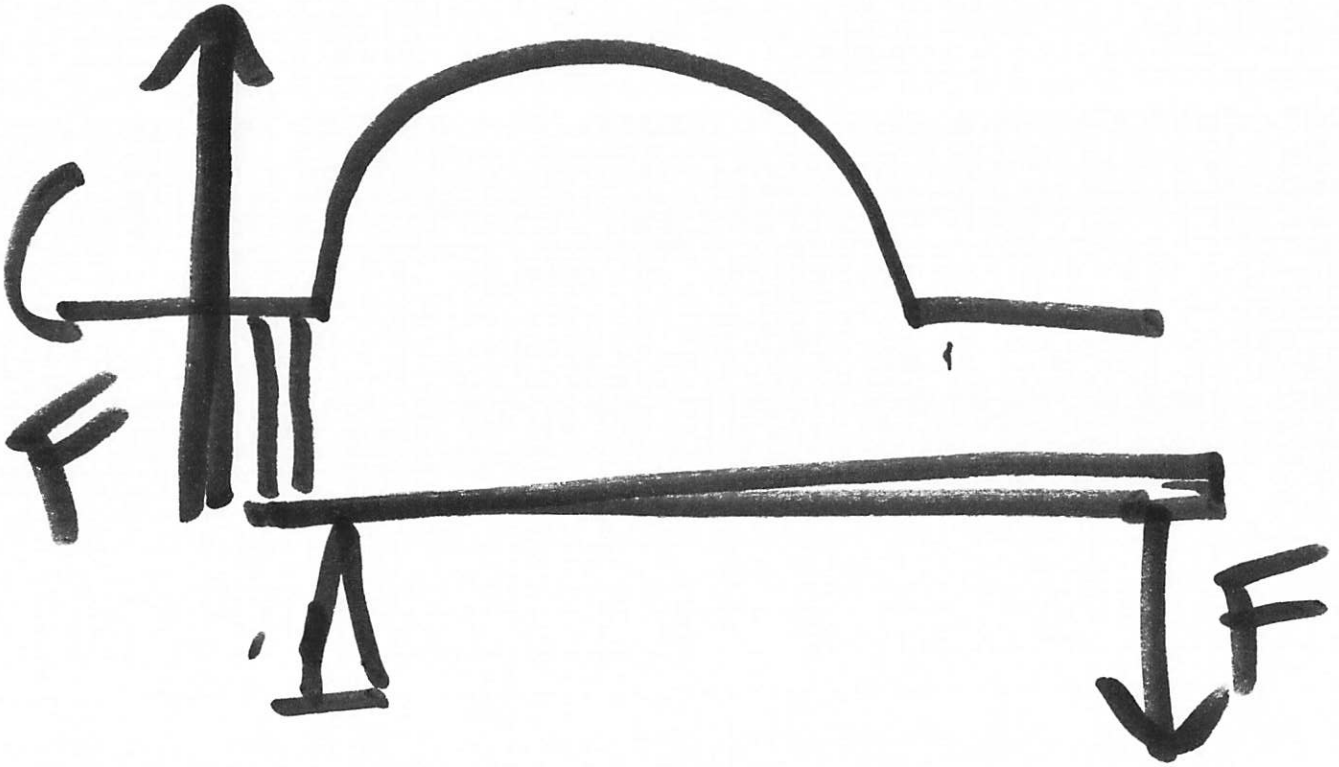
Statics: Forces sum to zero
Torques sum to zero.

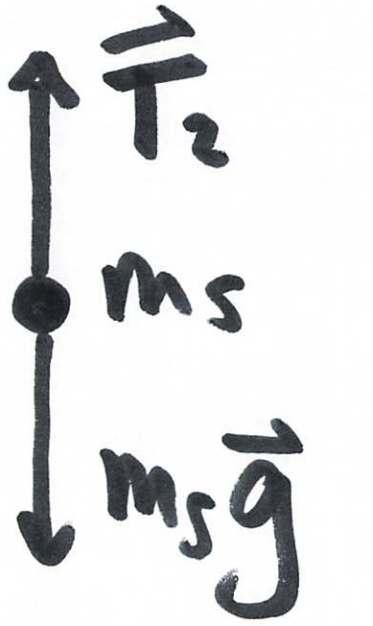




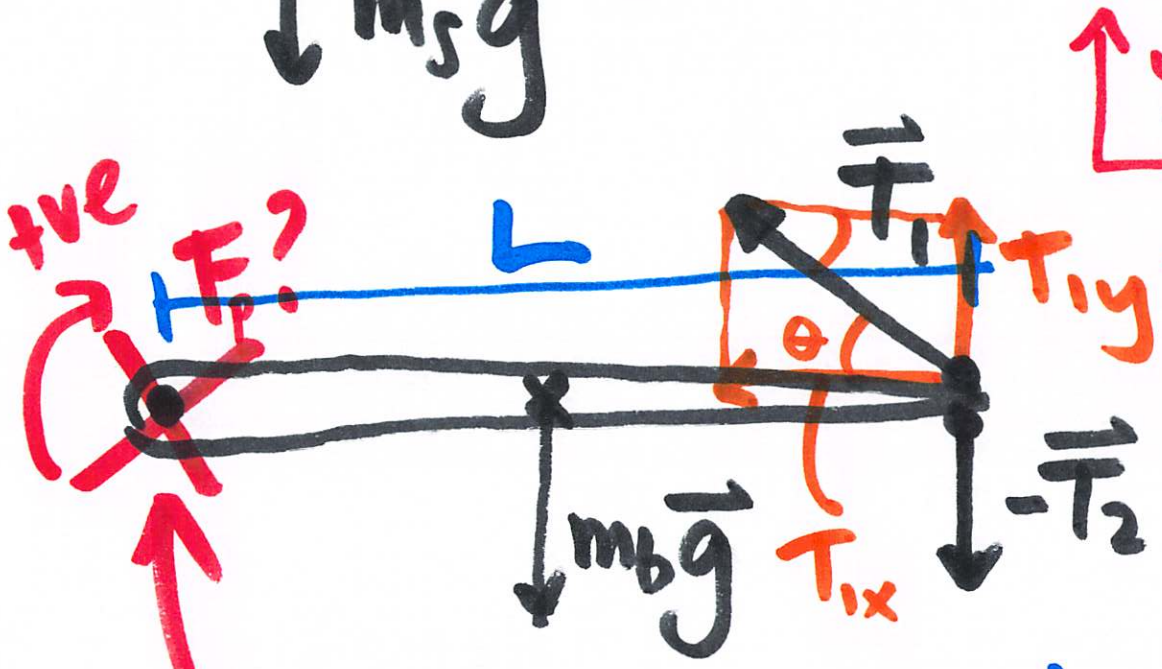
mechanical disadvantage.

mechanical advantage


F
F



static: $|T_2| = |m_s\vec{g}|$



$T_{1y} = |\vec{T}_1|\sin\theta$

only $T_1 \sin\theta$ is ⊥ to radius

ref pt.

torques: $|T_2|L + |m_b\vec{g}|\frac{L}{2} - |T_1|L\sin\theta$

(put it here b/c we don't know $\vec{F}_p$)

(A) $T_2 L + m_b g \frac{L}{2} - T_1 L \sin\theta = 0$ { torque!

(B) $F_x = -T_1 \cos\theta + F_{px} = 0$ { $a_x = 0$

F_{px}: x-component of the unknown force

(C) $F_y = -m_b g - T_2 + T_1 \sin\theta + F_{py} = 0$

(D) $T_2 - m_s g = 0$ — sign is static too!

$$T_2 = m_s g \quad \checkmark$$

$$T_1 L \sin\theta = m_s g L + m_b g \frac{L}{2}$$

$$T_1 = \frac{m_s g + \frac{1}{2} m_b g}{\sin\theta} \quad \checkmark$$

$$F_{px} = T_1 \cos\theta = \left[m_s g + \tfrac{1}{2} m_b g\right] \frac{\cos\theta}{\sin\theta}$$

$$F_{py}: \quad \tfrac{1}{2} m_b g - m_s g + (m_s g + \tfrac{1}{2} m_b g) + F_{py} = 0$$

$$F_{py} = \tfrac{1}{2} m_b g$$