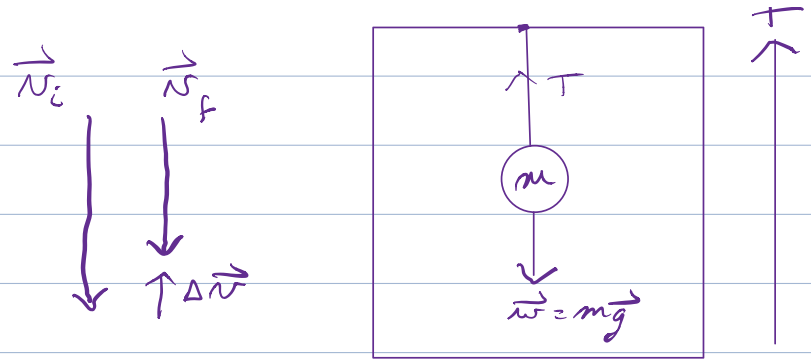
••42 A lamp hangs vertically from a cord in a descending elevator that decelerates at 2.4 m/s^2. (a) If the tension in the cord is 89 N, what is the lamp's mass? (b) What is the cord's tension when the elevator ascends with an upward acceleration of 2.4 m/s^2?



$\vec{v}$ is negative

$\vec{a} = +2.4\ m/s^2\ \hat{j}$

$\Sigma \vec{F} = m\vec{a}$

$T - mg = ma$

$T = ma + mg = m(a+g)$

$m = \dfrac{T}{a+g} = \dfrac{89\ N}{(2.4+9.8)\ m/s^2} =$ **7.30 kg**

actual weight

$mg = (7.30\ kg)(9.8\ m/s^2) = 71.5\ N$

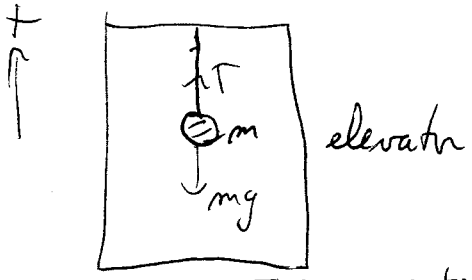
apparent weight = T = 89 N

General advice: Step off the elevator.

Make your measurements in an inertial frame of reference.

HRW-8

5-42



N is negative

Observe $a = +2.4\ m/s^2$

Observe $T = 89\ N$

$m = ?$

Step off elevator: $\Sigma F = ma$

$T - mg = ma$

$T = m(g+a)$

$m = \frac{T}{g+a} = \frac{89\ N}{9.8+2.4} = 7.295 \approx 7.30\ kg.$

actual weight = $mg = 71.5\ N$

apparent weight = $89\ N$

General advice — don't worry about "apparent weight" Sit in an inertial (non-accelerated) reference frame and apply $\Sigma F = ma$.