§ 10-2 Multiple Masses

Masses connected with ropes/strings

- tension is equally distributed
- rope/string is of uniform composition
- the mass of the rope or string is negligible
- the rope or string does not stretch
- pulley => changes the direction of the force.

MP|477 (Elevator Problem)

$m = 2245\,kg$

$\vec{a} = 0.55\,m/s^2\,[up]$ (+)

$T = ?$

$\vec{F}_{net} = m\vec{a}$

$T - F_g = ma$

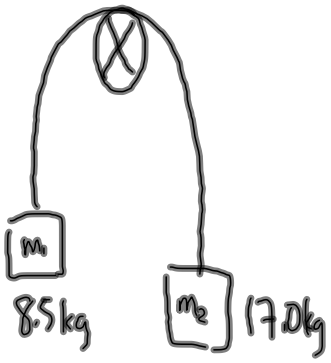
$T - 22023.45N = (2245kg)(+0.55m/s^2)$

$T - 22023.45N = 1234.75N$

$T = 23258.2N$

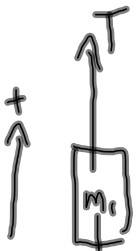
$T \doteq 2.33 \times 10^4\,N$

MP 4.83



Atwood's Machine $a = ?$ $T = ?$

Consider m_1 alone



$\vec{F}_{net} = m\vec{a}$

$T - F_{g_1} = m_1 a$

$T - 83.385N = (8.5kg)a$

$F_{g_1} = (8.5kg)(9.81 m/s^2)$

$F_{g_1} = 83.385N$

Consider m_2 alone:

$\vec{F}_{net} = m\vec{a}$

$F_{g_2} - T = ma$

$166.77N - T = (17.0kg)a$

$F_{g_2} = (17.0kg)(9.81 m/s^2)$

$F_{g_2} = 166.77N$

Solve the system of Eq:

$T - 83.385N = (8.5kg)a$

$+ (166.77N - T = (17.0kg)a) +$

$166.77N - 83.385N = (25.5kg)a$

$83.385N = (25.5kg)a$

$a = 3.27 m/s^2$

Sub into:

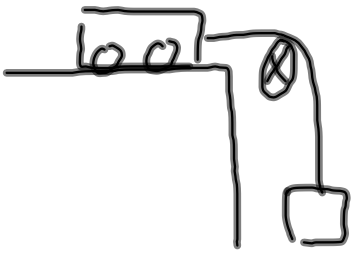
$T - 83.385N = (8.5kg)a$

$T - 83.385N = (8.5kg)(3.27 m/s^2)$

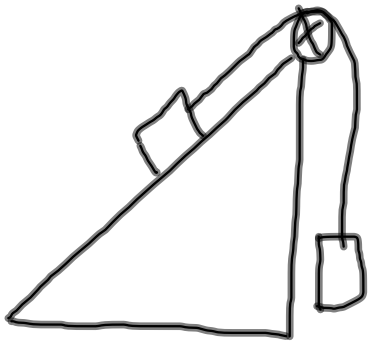
$T - 83.385N = 27.795N$

$T = 111N$!

Tomorrow:



Fletcher's Trolley.



Incline Pulley.

TO DO:

PP/478 (Elevator)

PP/485 (Atwood's)