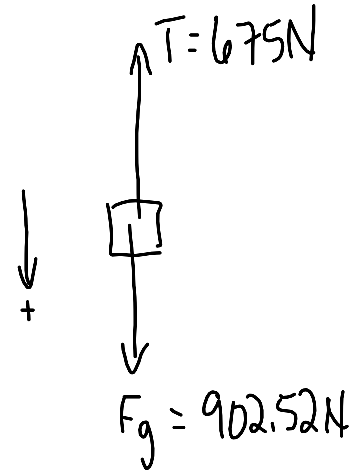
PP|478

15. $m = 92\,kg$ $(F_g = 902.52\,N)$

$T = 675\,N$

$a = ??$




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

$$F_g - T = ma$$

$$902.52\,N - 675\,N = (92\,kg)a$$

$$227.52\,N = (92\,kg)a$$

$$a = +2.5\,m/s^2$$

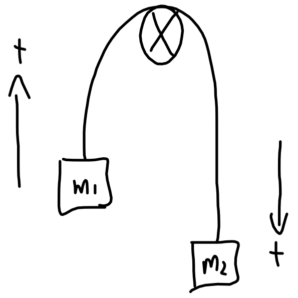
$$\vec{a} = 2.5\,m/s^2\ [down]$$

16.

22. (PP|485)

$m_1$ (window) = 4.5 kg

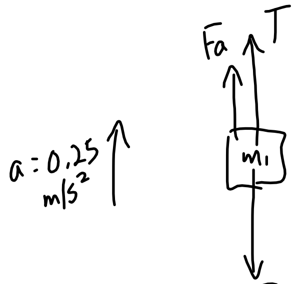
$m_2$ (counter weight) = 3.0 kg




$F_a = ??$

$a = 0.25\,m/s^2$

Consider $m_1$:




$F_{g_1} = (4.5kg)(9.81m/s^2)$

$F_{g_1} = 44.145N$

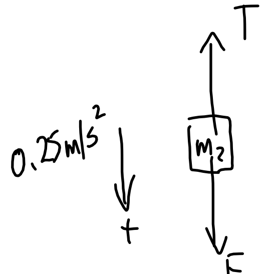
$\vec{F}_{net} = m\vec{a}$

$F_a + T - F_{g_1} = m_1 a$

$F_a + T - 44.145N = (4.5kg)(0.25m/s^2)$

$F_a + T - 44.145N = 1.125N$

Consider $m_2$:




$F_{g2} = (3.0kg)(9.81m/s^2)$

$F_{g2} = 29.43N$

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

$F_{g2} - T = m_2 a$

$29.43N - T = (3.0kg)(0.25m/s^2)$

$29.43N - T = 0.75N$

$T = 28.68N$

Sub T = 28.68N into:

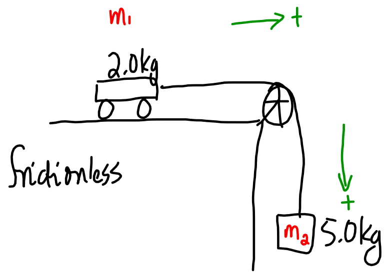
$F_a + T - 44.145N = 1.125N$

$F_a + 28.68N - 44.145N = 1.125N$

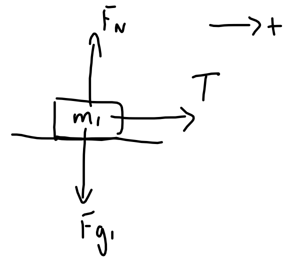
$F_a - 15.465N = 1.125N$

$F_a = 16.59N$

# Fletcher's Trolley Example




Consider $m_1$:

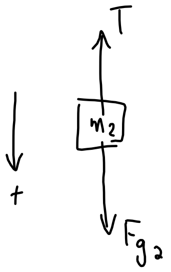



$\vec{F}_{net} = m\vec{a}$

$T = ma$

$T = (2.0kg)a$

Consider $m_2$:




$F_{g2}$: $(5.0kg)(9.81m/s^2)$

$49.05N$

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

$F_{g2} - T = m_2 a$

$49.05N - T = (5.0kg)a$

Solving the system of equations by substitution:

$49.05N - (2.0kg)a = (5.0kg)a$

$49.05N = (7.0kg)a$

$a = 7.0m/s^2$

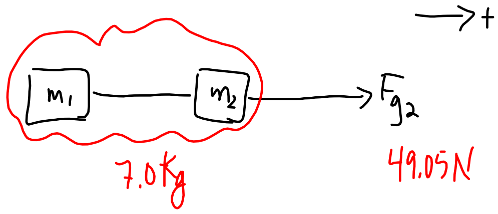
Sub $a = 7.0m/s^2$ into:

$T = (2.0kg)a$

$T = (2.0kg)(7.0N)$

$T = 14N$

Another way to think about this problem:



MP|486

$m_1 = 615g$

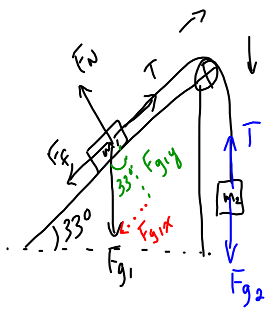
$m_2 = 525g$

$\mu_k = 0.19$

a) $a = ?$

b) $T = ?$

$\theta = 33^\circ$




IF $m_1$ goes uphill, then the maximum value for the tension would be $F_{g_2}$.

In order to check to see what direction the system moves, we need to see if

$$F_{g_2} > F_{g_1x} + F_f$$

$F_{g_2} = (0.525kg)(9.81m/s^2) = 5.15N$

$F_{g_1x} = F_{g_1}\sin\theta = (0.615kg)(9.81m/s^2)\sin 33^\circ = 3.29N$

$F_f = \mu F_N = \mu F_{g_1y} = \mu F_{g_1}\cos\theta$

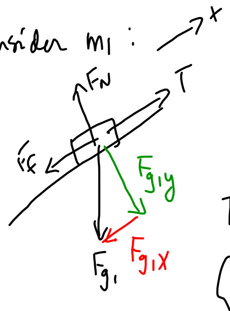
$= (0.19)(0.615kg)(9.81m/s^2)\cos 33^\circ = 0.961N$

4.25N

If true then $m_1$ goes uphill

and it DOES!!

Consider $m_1$:

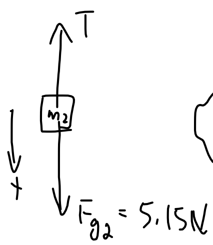



$\vec{F}_{net} = m\vec{a}$

$T - (F_f + F_{g_1x}) = m_1 a$

$T - 4.25N = (0.615kg)a$

Consider $m_2$:




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

$F_{g_2} - T = m_2 a$

$5.15N - T = (0.525kg)a$

Solve the system

a) $a = 0.79 m/s^2$

b) $T = 4.7N$

To Do: PP|488-489 (26 optional)

best to stretch this one out + look at horizontally