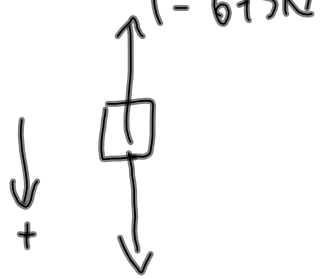
PP|478

15.



$F_g = (92kg)(9.81 m/s^2)$

$F_g = 902.52N$

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

$F_g - T = ma$

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

$227.52N = (92kg)a$

$a = 2.47 m/s^2$

$2.5 m/s^2$ [down]

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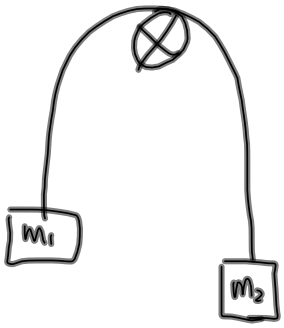
22.

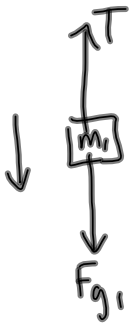
$m_1 = 3.0kg$ (counterweight)

$m_2 = 4.5kg$ (window)

$F_a = ?$ $a = 0.25 \frac{m}{s^2}$



Consider m_1:



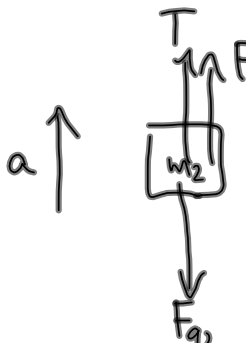
$\vec{F}_{net} = m\vec{a}$

$F_{g_1} - T = m_1 a$

$29.43N - T = (3.0kg)(0.25 \frac{m}{s^2})$

$T = 28.68N$

Consider m_2:



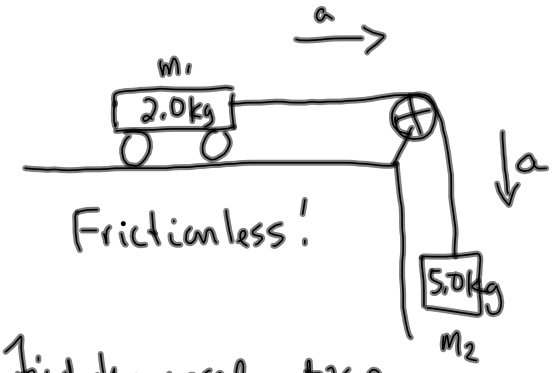
$\vec{F}_{net} = m\vec{a}$

$T + F_a - F_{g_2} = m_2 a$

$F_a = m_2 a - T + F_{g_2}$

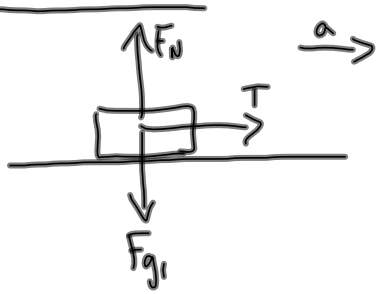
More Connected Masses

Fletcher's Trolly



Find the accelerations of the system and the tension in the string.

Consider m_1:

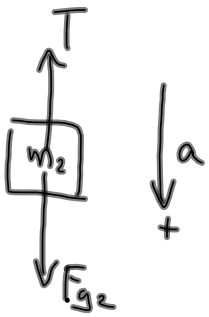


$\vec{F}_{net} = m\vec{a}$

$T = m_1 a$

$T = (2.0kg)a$

Consider m_2:



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

$F_{g_2} - T = m_2 a$

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

substitution

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

$49.05N = (7.0kg)a$

$a = 7.0m/s^2$

$T = (2.0kg)(7.0m/s^2)$

$T = 14N$

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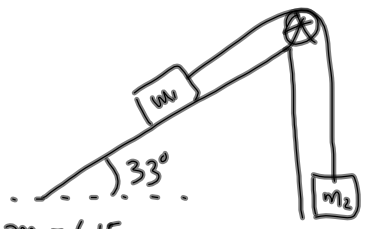


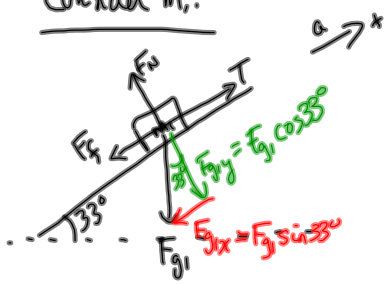
$m_1 = 615g$

$m_2 = 525g$

$\mu_k = 0.19$

$a = ?$ $T = ?$

Consider m_1:



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

$T - (F_f + F_{g1x}) = m_1 a$

$T - (\mu F_N + F_{g1}\sin\theta) = m_1 a$

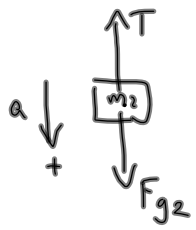
$T - (\mu F_{g1}\cos\theta + F_{g1}\sin\theta) = m_1 a$

$T - \left(0.19(0.615kg)\left(9.81\frac{m}{s^2}\right)\cos 33° + (0.615kg)\left(9.81\frac{m}{s^2}\right)(\sin 33°)\right) = (0.615kg)a$

$T - (0.961N + 3.29N) = (0.615kg)a$

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

Consider m_2:



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

$F_{g2} - T = m_2 a$

$(0.525kg)(9.81m/s^2) - T = (0.525kg)a$

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

Adding:

① $T - 4.25 = 0.615a$

② $5.15 - T = 0.525a$

$0.90N = (1.14kg)a$

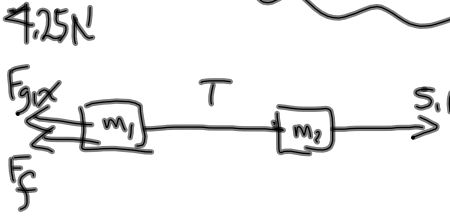
$a = 0.79\ m/s^2$

sub into ①

$T = 0.615a + 4.25$

$T = 0.615(0.79) + 4.2$

$T = 4.9N$



TODO: PP|488-489| not 26