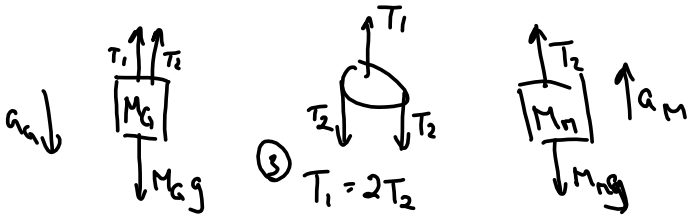
① $3a_G = a_M$



$\Sigma F = M_G g - (T_1 + T_2) = M_G a_G$

② $5g - (T_1 + T_2) = 5a_G$

$5g - 3T_2 = 5a_G$

$5g - 3(3a_G + g) = 5a_G$

$2g = 14a_G$

$a_G = \frac{1}{7} g$

$\Sigma F = T_2 - M_M g = M_M a_M$

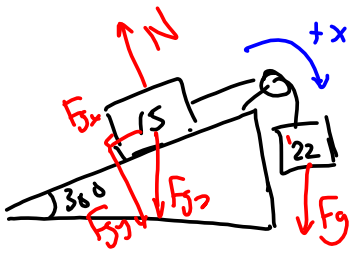
④ $T_2 - g = a_M$

$T_2 - g = 3a_G$

$T_2 = 3a_G + g$

$a_M = \frac{3}{7} g = 0.429\, g$ upward

$\mu = 0$



$F_{g2} = m_2 g$
$= 147N$

$F_{gx} = F_{g2} \sin 35°$
$= 73.5N$

$\Sigma F = F_g - F_{gx} = (m_1 + m_2) a$

$215.6 - 73.5N = 37kg\ a$

$\frac{142.1\ N}{37kg} = a$

$3.8\ m/s^2 \hat{x} = a$

What m_1 would cause the 15kg mass to slide uphill at $2\ m/s^2$?

$\Sigma F = F_{g1} - F_{gx} = (m_1 + m_2) a$

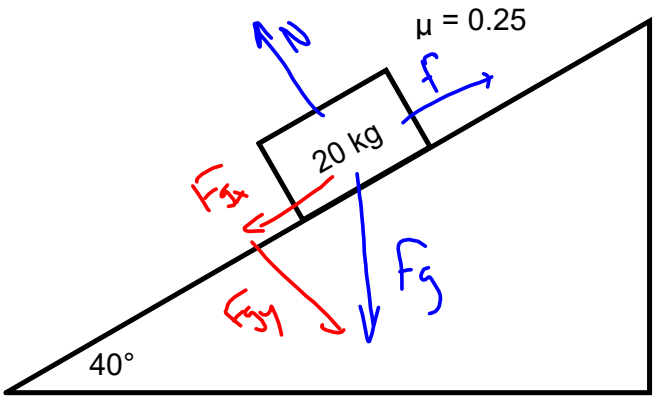
$m_1 g - 73.5N = (m_1 + 15)(2)$

$9.8 m_1 - 73.5 = 2m_1 + 30$

$7.8 m_1 = 103.5$

$m_1 = \frac{103.5}{7.8} = 13.3kg$

Quiz



$\Sigma F = F_{gx} - f = ma$

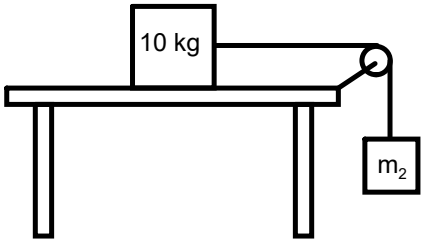
$mg\sin\theta - \mu mg\cos\theta = ma$

$a = g(\sin 40° - 0.25\cos 40°)$

$= 4.4\ m/s^2$ downhill

1. Draw the diagram and label the real forces.
2. Determine the acceleration of the object.
3. What size force (in addition to the ones in questions 1 and 2) would be required to make the object move up the hill at a constant speed? friction flips, $\Sigma F = 0$ ☺

$F = f + F_{gx} = 163.5\ N$



If there is a static coefficient of friction, μ_s=0.40 and a kinetic coefficient, μ_k=0.25 between the 10 kg mass and the table:

Determine the minimum mass, m_2, needed to get the system started. Once moving, determine the acceleration of the system, the tension in the rope, and the speed after 1.5 s.

Homework:
Read pp. 478-489
Questions 26-28 p 489

Test on Monday: Vector addition, inclines, pulleys and FBDs