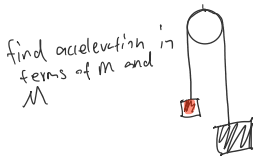
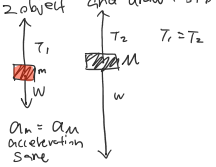
Pulley

Monday, 4 March 2024 11:28 AM



1. seperate mass into 2 object and draw FBD



2. write out Newton second law equation

$F_{net} = ma \qquad T_1 - mg = F_{net}$

$ma = T_1 - mg$

$Ma = Mg - T_2$

$T_1 = T_2$

$ma + mg = T$

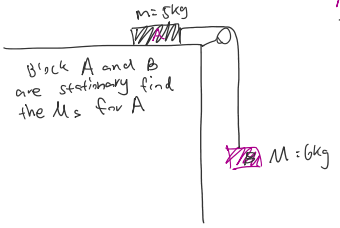
$Mg - Ma = T$

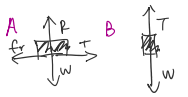
$ma + mg = Mg - Ma$

$ma + Ma = Mg - mg$

$a(m+M) = Mg - mg$

$a = \frac{Mg - mg}{m+M}$





$f_r = T \qquad T = W$

$R = W \qquad M_B g = T_B$

$F_r = T = R\mu$

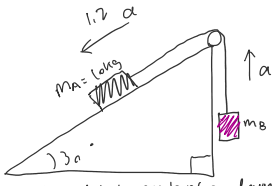
$m_A g = R$

$T_A = m_A g \cdot \mu$

$T_A = T_B$

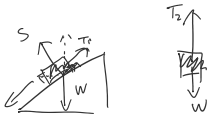
$m_A g = m_B g \mu$

$\frac{m_A g}{m_B g} = \mu = \frac{6}{5}$



A 10kg block accelerates down slope at $a = 1.2\ m/s^2$ if $\mu_K = 0.15$ what is the size of mass "m" ?

dynamic as its moving



$F = ma \qquad F_w = 100N$

$10 \times 10 = 100N$

$F_R - (T_1 + f_d) = F_{net}$

$10 \times 1.2 = 12N$

$12 - (T_1 + f_d) = F_{net}$

$12 - T_1 - R\mu = F_{net}$

$12 - T_1 - 0.15R = ma$

$F = ma$

$F_{net} = T - mg$

$T_2 - mg = ma$

$T_1 = T_2$

$T_2 = mg + ma$

$12 - 0.15R - ma = T_1$

$mg + ma = 12 - 0.15R - ma$

$2ma = 12 - 0.15R - mg$

$2ma = 12 - 0.15R - 10m$

$2ma + 10m = 12 - 0.15R$

$3m + 10M = 12 - 0.15R$

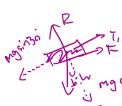
$13M = 12 - 0.15R$

$13M = 12 - 0.9$

$m = 0.85\ kg$

$R = 12 \sin 30$

$= 6$



$R = mg\cos 30$

$F_{net} = T - mg$

$ma = T - mg$

$m_B a = T - m_B g$

$m_A a + m_B g = T$

$m_A(a+g) = T$

$m_A = \frac{T}{a+g}$

$m_A = 2.2$

$F_{net} = mg\sin 30 - F_d - T_1$

$m_A a = m_A g \sin 30 - F_d - T_1$

$m_A a = m_A g \sin 30 - \mu(mg\cos 30) - T_1$

$T = 10 \times 9.81 \times \sin 30° - 0.15 \times 10 \times 9.81 \times \cos 30° - 10 \times 1.2$

$T = 24.31N$