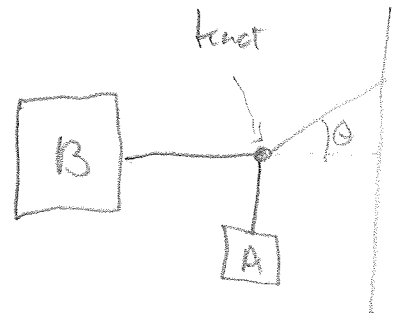
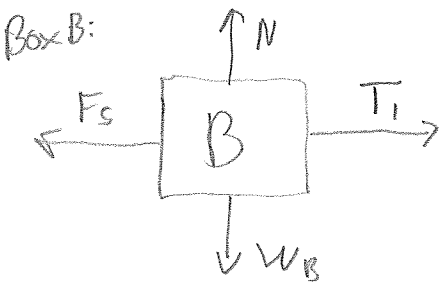
6-25 Two things here we will need to figure out: What happens to box B? What happens to knot?



Box B:



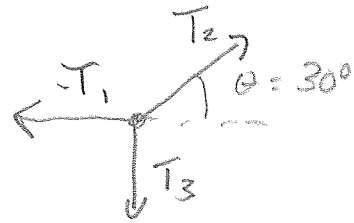
Box B has 4 forces: Weight down (711N) and the normal force opposing it N
T_1 pulling to the right with the string, and F_s friction opposing that.

$\Sigma F_x = T_1 - F_s = ma_x = 0$ (equilibrium) so $T_1 = F_s$

$\Sigma F_y = N - W_B = ma_y = 0$ " $N = W_B = 711N$

Friction force $F_s = \mu_s N = \mu_s W_B$, μ_s given as 0.25: $T_1 = \mu_s W_B$

Knot: 3 forces, all T in strings:

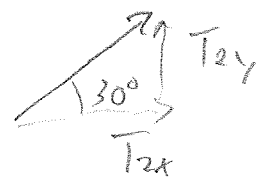


T_1 equal and opposite to T_1 on box B.

T_3 downwards ($m_A \cdot g$) T_2 up to wall at 30°

Put T_2 into T_{2x}, T_{2y}: $T_{2x} = T_2 \cos 30°$

$T_{2y} = T_2 \sin 30°$



$\Sigma F_x = T_2 \cos 30° - T_1 = ma_x = 0 \Rightarrow T_2 = \frac{T_1}{\cos 30°}$

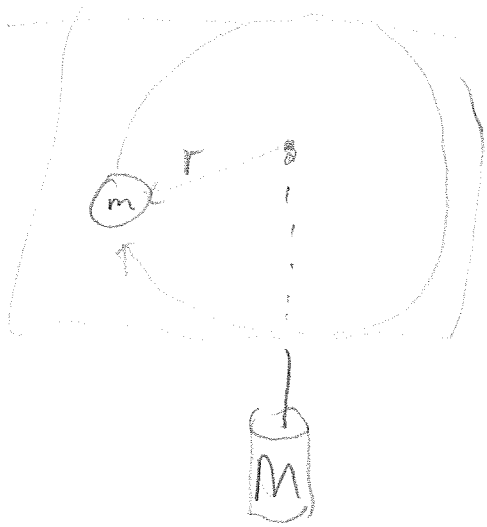
$\Sigma F_y = T_2 \sin 30° - m_A g = ma_y = 0$ ← subst: $\left(\frac{T_1}{\cos 30°}\right)\sin 30 = m_A g$

Eliminate unknown "T_2" by subst. solve for m_A:

$W_A = m_A g = T_1 \frac{\sin 30}{\cos 30} = T_1 \tan 30° = \mu_s W_B \tan 30°$

$= (0.25)(711\,N)\tan 30° = 103\,N = 1.0 \times 10^2\,N$

6-57 | $m = 1.50\,kg$ $r = 20.0\,cm$ $M = 2.50\,kg$



puck goes in circle around hole, held in a circle by string.

Look at puck:

T in string is what pulls puck in circle, balancing out centripetal force $\frac{mv^2}{r} = T$

Mg is pulling on string, supplies the T, so $T = Mg$

so $T = Mg = \frac{mv^2}{r}$

solve for v: $v = \sqrt{\frac{Mgr}{m}}$

$$= \sqrt{\frac{(2.50\,kg)(9.8\,m/s^2)\cdot(0.200\,m)}{1.50\,kg}}$$

$$v = 1.81\,m/s$$