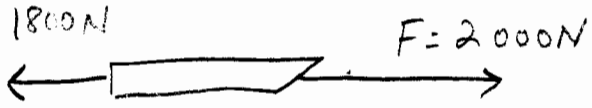
6. $M_F = 1.5 \times 10^7 \text{ Kg}$ $\quad F_F = 7.5 \times 10^5 \text{ N}$

$F_F = Ma_s \Rightarrow a_s = \dfrac{7.5 \times 10^5 \text{ N}}{1.5 \times 10^7 \text{ Kg}} = .05 \frac{\text{M}}{\text{S}^2}$

$V_f = V_0 + at$

$80 \times 10^3 \frac{\text{M}}{\text{S}} = 0 + .05 \frac{\text{M}}{\text{S}^2} t \Rightarrow t = \dfrac{80 \times 10^3}{.05} = \underline{1.6 \times 10^6 \text{ S}}$

11. 

(A) $F_N = \Sigma F_x = 2000\text{N} - 1800\text{N} = 200\text{N}$

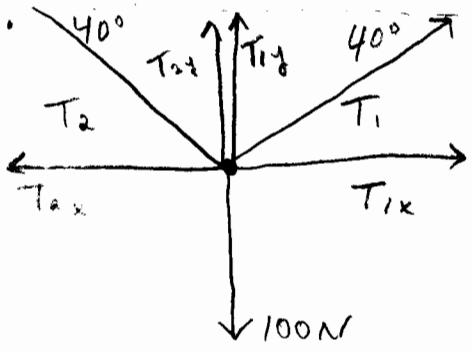
$F = MA \Rightarrow A = \dfrac{200\text{N}}{1000\text{ Kg}} = .2 \frac{\text{M}}{\text{S}^2}$

(B) $\Delta x = \cancel{V_0 t}^{\,0} + \frac{1}{2} a t^2$

$= \frac{1}{2}(.2 \text{ M/S}^2)(10)^2 = 10$

$\boxed{\Delta x = 10 \text{ m}}$

(C) $V_f = V_0 + at = 0 + (.2)(10\text{s}) = \boxed{2 \frac{\text{M}}{\text{S}}}$

16. 

$T_{1y} = T_1 \sin 40° \quad T_{2y} = T_2 \sin 40°$

$T_{1x} = T_1 \cos 40° \quad T_{2x} = T_2 \cos 40°$

BECAUSE OF SYMMETRY, $T_1 = T_2 = T$

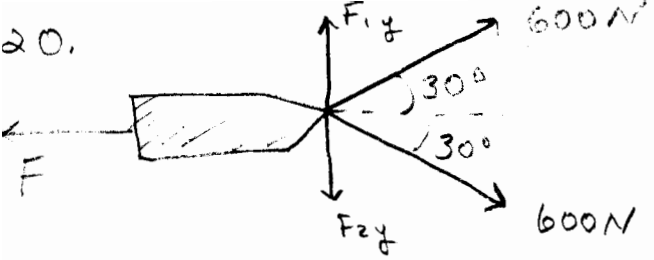
$\therefore \Sigma F_y = T\sin 40° + T\sin 40° - 100 = 0$

$2T\sin 40 = 100$

$\boxed{T = 32.1\text{N}}$

HOW WOULD YOU SOLVE IF ANGLES WERE DIFFERENT?

20.



F_y COMPONENTS ARE EQUAL & OPP SO THEY CANCEL & WE ONLY HAVE TO CALCULATE F_x COMPONENTS

$F_{x_1} = 600 \cos 30°$ $F_{x_2} = 600 \cos 30°$

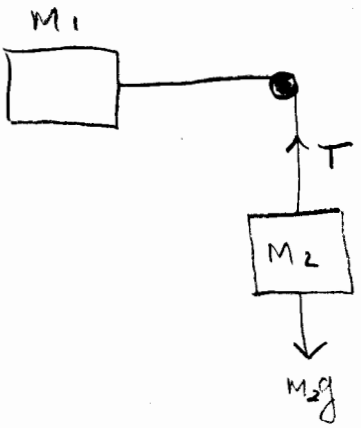
$F_{x_1} = 519.6\,N$ $F_{x_2} = 519.6\,N$

CONSTANT V MEANS $A = 0 \Rightarrow F_{NET} = 0$

$\Sigma F_x = F_{x_1} + F_{x_2} - F = 0 \Rightarrow F = 519.6\,N + 519.6\,N$

$$\boxed{F = 1039\,N}$$

30.



$F = MA$

$M_2 g = (M_1 + M_2)A$

$(10Kg)(9.8\frac{m}{s^2}) = (10Kg + 5Kg)A$

$$\boxed{6.5\frac{m}{s^2} = A}$$

$\Sigma F_y = M_2 g - T = M_2(6.5)$

$(10)(9.8\frac{m}{s^2}) - T = (10Kg)(6.5\frac{m}{s^2})$

$$\boxed{T = 33N}$$

36. (A) $\Sigma F = M_2 g - \mu_S F_{N m_1} = (M_1 + M_2)A$

$(4Kg)(9.8\frac{m}{s^2}) - .5(10Kg)(9.8\frac{m}{s^2}) = -9.8 \leq 0$

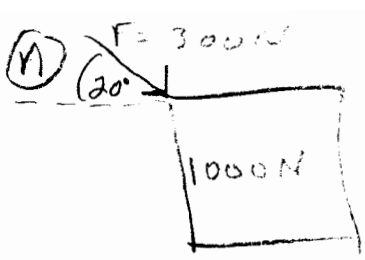
SO $A = 0$ SINCE THE BOX WILL NEVER BEGIN ROLLING.

(B) $\Sigma F = M_2 g - \mu_K F_{N m_1} = (M_1 + M_2)A$ ⟸ MOVING SO USE μ_K

$= (4)(9.8) - (.3)(10)(9.8) = (10 + 4)A$

$9.8 = (14)A$

$$\boxed{.7\frac{m}{s^2} = A}$$

37. (A) 

$V=0$ so: $\sum F_x = F\cos 20° - \mu_K F_N = 0$

BUT F_N HAS TWO CONTRIBUTIONS:

$F_N = 1000N + F_y = 1000N + 300\sin 20° = 1103$

$F\cos 20° = \mu_K F_N$

$281N = \mu_K (1103N)$

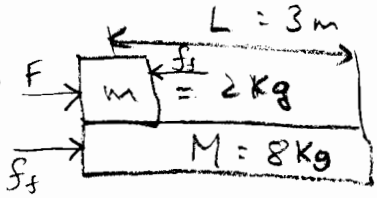
$.256 = \mu_K$

(B) $\sum F_x = F\cos 20° - \mu_K F_N = MA$

THIS TIME $F_N = 1000N - F_y = 1000 - 300\sin 20° = 897.3N$

$281 - (.256)(897.3) = \frac{1000N}{9.8\ m/s^2} \cdot A$

$.5\ \frac{m}{s^2} = A$

52. 

$F_{NET} = \sum F_{mx} = F - f_f = 10N - 2(9.8\frac{m}{s^2})(.3) = 4.12N$ ($f_f = F_{mgx}$)

$F_{NET} = MA = 4.12$

$2A = 4.12$

$A = 2.06\ m/s^2$

$\Delta x = V_0 t + \frac{1}{2} a t^2$

$3 = \frac{1}{2}(2.06)t^2$

$t = 1.75$

(B) $F_M = f_s = 2(9.8\frac{m}{s^2})(.3) = 5.88N = MA$

$5.88N = 8Kg\ A$

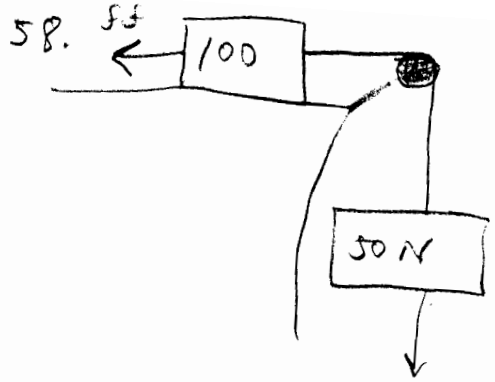
$.735\frac{m}{s^2} = A$

$\Delta x = V_i t + \frac{1}{2} a t^2$

$\Delta x = \frac{1}{2}(.735)(1.7)^2$

$\Delta x = 1.06\ m$

58.



(A) $\Sigma F = m_1 g - F_f = 0$

$= 50 - f_s = 0$

$f_s = 50N$

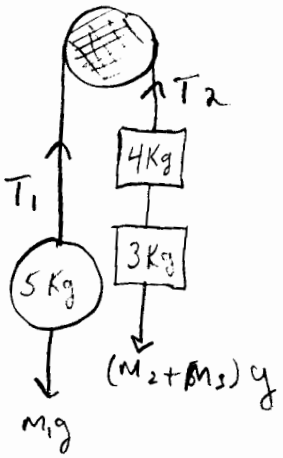
(B) $f_s = 100\mu_s = 50$

$\boxed{\mu_s = .5}$

(C) $\Sigma F = F_{mg} - (100)(.25) = 0$

$\boxed{F_{mg} = 25}$

62.



(A) $F_{NET} = \Sigma F = 5(9.8\frac{m}{s^2}) - (3+7)(9.8\frac{m}{s^2}) =$

$F_{NET} = -49N = 49N$ DOWN ON RIGHT SIDE

SAME FOR BOTH

(B) $T_1 - m_1 g = 49N$

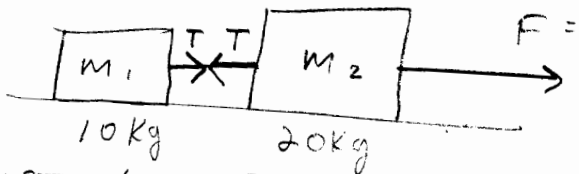
$T_1 - (5)(9.8) = 49N$

$\boxed{T_1 = 98N}$

$(3+7)(9.8\frac{m}{s^2}) - T_2 = 49N$

$\boxed{T_2 = 49N}$

65.



MUST HAVE SAME ACC.

(A) $F = MA = (30Kg)(A) = 50N$

$\boxed{A = 1.6\frac{m}{s^2}}$ FOR BOTH.

$\Sigma F = 50 - T = M_2 A$

$50 - T = (20Kg)(1.6\frac{m}{s^2})$

$\boxed{T = 18N}$

(B) $F - Ff = 50 - (10)(9.8)(.1) - (20)(9.8)(.1) = MA$

$20.6 = 30A$

$\boxed{.68\frac{m}{s^2} = A}$