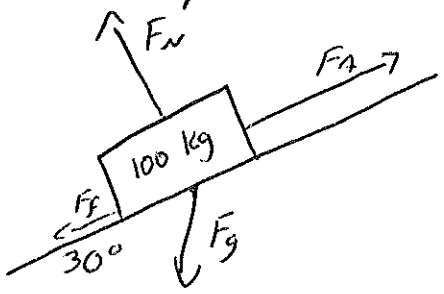
Chapter 5 Practice Test

(36)



$A = \frac{2D}{T^2}$ ($V_i = 0$ - constant Acc)

$= \frac{2(10m)}{(3s)^2} = 2.22 m/s^2$

$\Sigma F_y = F_N - mg\cos\theta = MA_y^{\,0}$ $\quad F_N = mg\cos\theta$

$\Sigma F_x = F_A - mg\sin\theta - \mu mg\cos\theta = MA_x$

$F_A = MA_x + mg\sin\theta + \mu mg\cos\theta$

$= (100kg)(2.22m/s^2) + (100kg)(10m/s^2)\sin 30 + (.1)(100kg)(10m/s^2)\cos 30°$

$= 222N + 500N + 86.6N = 809N$

D

(#37) If you use $g = 10m/s^2$ $F_{f,s} = 250N$

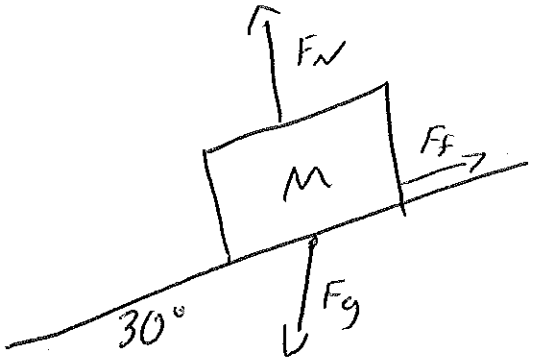
A

If you use $g = 9.81m/s^2$ $F_{f,s} = 245N$ ∴ moves right

$F_{NET} = 250N - F_{f,k} = 250N - (.35)(25kg)(9.81) = 164N$

C

(38)



$$\Sigma F_y = F_N - F_g \cos\theta = M\cancel{A_y}^{0}$$

$$F_N = m \cdot g \cos\theta$$

$$\Sigma F_x = mg\sin\theta - \mu F_N = M \cdot A_x$$

$$\cancel{m}g\sin\theta - \mu \cancel{m} \cdot g\cos\theta = \cancel{M} \cdot A_x$$

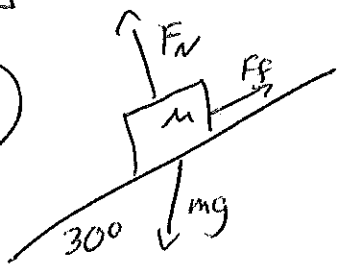
$$10\sin 30° - (.2)(10)\cos 30° = A$$

$$5 - 1.73 = A$$

$$A = 3.27\ m/s^2$$

B

(39)



(stationary)

$$\Sigma F_x = mg\sin\theta - F_f = M\cancel{A_x}^{0}$$

$$\Sigma F_y = F_N - mg\cos\theta = M\cancel{A_y}^{0}$$

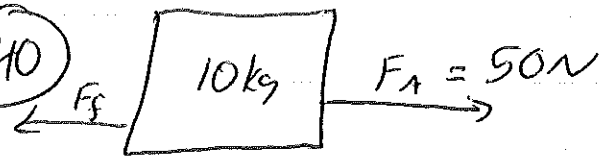
$$F_N = mg\cos\theta$$

$$mg\sin\theta - \underbrace{\mu mg\cos\theta}_{F_S} = 0$$

$$F_S = mg\sin\theta$$

D

(40)



$\mu_s = .6$ $\mu_k = .4$

If static

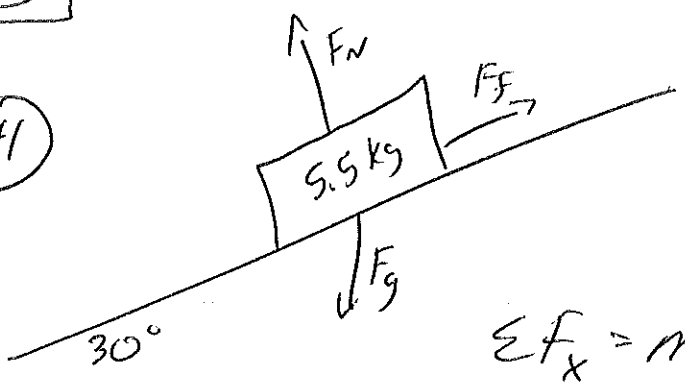
$$F_f = \mu_s \cdot M \cdot g = 60N$$

since $F_{f\cdot s}$ cannot be greater than F_A

$$F_{f\cdot s} = 50N$$

B

(41)



$$\Sigma F_y = F_N - mg\cos\theta = M \cdot \cancel{A_y}^{\,0}$$

$$F_N = mg\cos\theta$$

$$\Sigma F_x = mg\sin\theta - F_f = M \cdot A_x$$

$$\cancel{m}g\sin\theta - \mu\cancel{m}g\cos\theta = \cancel{M} \cdot A$$

$$5 - 3.03 = A$$

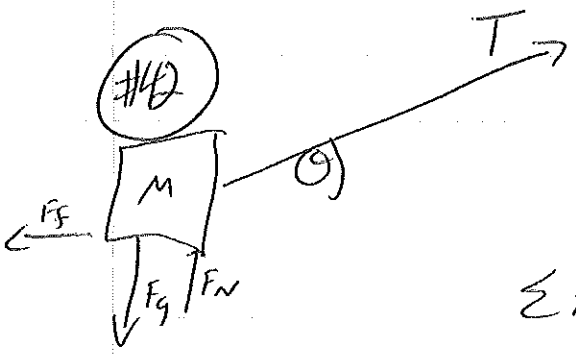
$$1.97 = A$$

$$V_2^2 = 0 \cdot V_1^2 + 2AD$$

$$V_2 = \sqrt{2(1.97 m/s^2)(72m)} = 16.8 m/s$$

D

#42



$\Sigma F_y = F_g - F_N - T_y = M \cdot \cancel{A_y}^{0}$

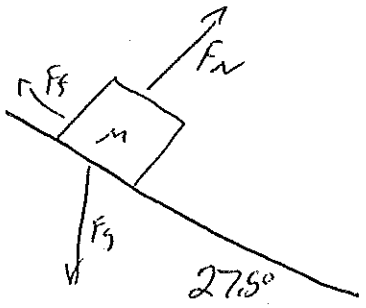
$F_N = F_g - T_y$

$\Sigma F_x = T_x - F_f = M \cdot A_x$

$F_f = \mu \cdot F_N = \mu (F_g - T_y) = \mu (mg - T\sin\theta)$

E

#43



$\Sigma F_y = F_N - mg\cos\theta = M \cdot \cancel{A_y}^{0}$

$F_N = mg\cos\theta$

$\Sigma F_x = mg\sin\theta - F_f = M \cdot A_x$

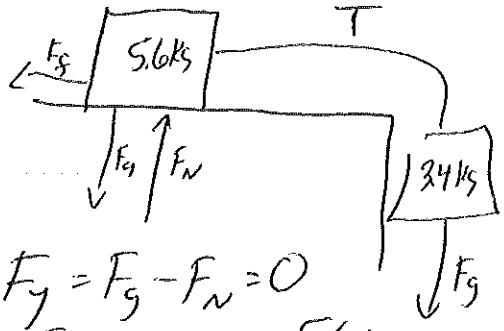
$mg\sin\theta - \mu mg\cos\theta = M \cdot A_x$

$g\sin\theta - \mu g\cos\theta = A_x$

$\mu = \dfrac{g\sin\theta - A_x}{g\cos\theta} = .109$

B

#44



$\Sigma F_y = F_g - T = M \cdot A$

$34 - T = 3.4 \cdot A$

$\Sigma F_y = F_g - F_N = 0$

$F_N = m \cdot g = 56N$

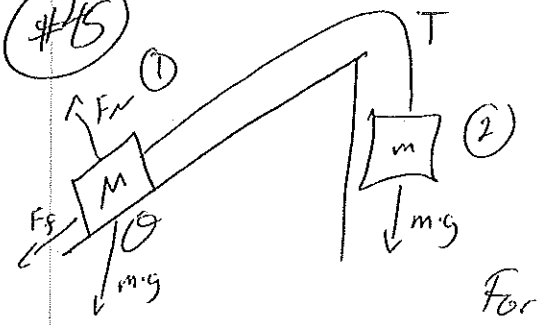
$\Sigma F_x = T - F_f = 5.6 \cdot A$

$T - 15.68 = 5.6 \cdot A$

$18.32 = 9A \quad A = 2.04 m/s^2$

B

#45



For object 2

$\Sigma F_y = m \cdot g - T = m \cdot A$

$(.2)(10) - T = .2 \cdot A$

For object 1

$\Sigma F_y = F_N - F_g \cos\theta = M \cdot A_y^{\,0}$ $\quad F_N = mg\cos\theta$

$\Sigma F_x = T - F_f^{\,mg\sin\theta} = M \cdot A$

$T - \mu mg\cos\theta - mg\sin\theta = M \cdot A$

$T - (.1)(.25kg)(10 m/s^2)\cos 30 - (.25kg)(10 m/s^2)\sin 30 = .25 \cdot A$

$T - .2165 - 1.25 = .25A$

$2 - T = .2A$

$.5335 = .45A$

$A = 1.186 m/s^2$

$V_2^2 = V_1^2 + 2AD$

$V_2 = \sqrt{2 \cdot A \cdot D} = \sqrt{2(1.186)(.3)} = .843 m/s$

A

#46

object 1

$T_1 - m_1 \cdot g = m_1 A$

$T_1 - 500 = 50 \cdot A$

object 3

$M_3 \cdot g - T_2 = M_3 \cdot A$

$1000 - T_2 = 100 \cdot A$

object 2

$T_2 - T_1 - F_f = M_2 \cdot A$

$T_2 - T_1 - (.2)(50)(10) = 50 \cdot A$

$T_2 - T_1 - 100 = 50 \cdot A$

A

$T_1 = 50 \cdot A + 500$

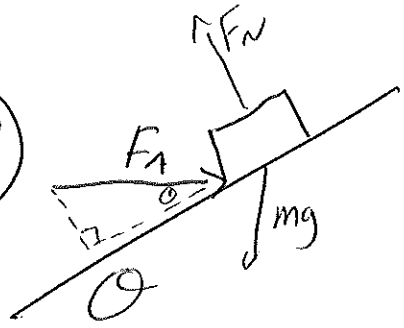
$T_2 = 1000 - 100A$

$1000 - 100A - (50A + 500) - 100 = 50 \cdot A$

$400 = 200 \cdot A$

$A = 2 m/s^2$

#47



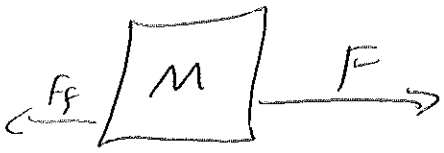
$$\Sigma F_y = F_N - mg\cos\theta \;\&\; F_A\sin\theta = M\cancel{A_y}^{\,0}$$

$$F_N = mg\cos\theta + F_A\sin\theta$$

C

#48 E - Newton's 1st Law

#49



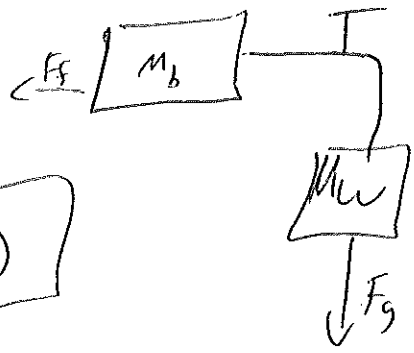
$$\Sigma F_x = F - F_f = M\cdot A$$

$$F - \mu\cdot m\cdot g = M\cdot A$$

$$\mu = \frac{F - M\cdot A}{m\cdot g} = \frac{F}{M\cdot g} - \frac{A}{g}$$

B

#50



D

$$A = \frac{M_w\cdot g - T}{M_w}$$

$$M_w\cdot g - T = M_w\cdot A$$

$$T - F_f = M_B\cdot A$$

$$M_w\cdot g - \mu M_B\cdot g = (M_w + M_B)\,A$$

E