Mock Exam #2 Answer Sheet

Please write all responses (and show all work) on this answer sheet. Nothing you write on the exam itself will be graded.

Multiple Choice Problems are worth 4 points each.

1. (a) b c d — due to air drag

2. a (b) c d — ceiling is holding up rope & lamp; rope is only holding up rope

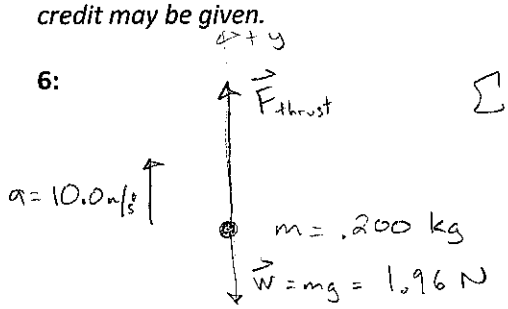
3. a b c (d) e — 3rd Law pairs only involve two objects, not three

4. a b (c) d e — lightest block will slip first

5. a b c d (e) — both read 10. lb

Short Answer questions are worth 5 points. Please show all of your work, and clearly designate your answer. Partial credit may be given.

6:



$\sum F_y = F_{thrust} - mg = ma$

$F_{thrust} = 1.96\ N + (.200\ kg)(10.\ m/s^2)$

$\boxed{F_{thrust} = 3.96\ N}$

7:

$V_i = 20.\ m/s \qquad V_f = 21\ m/s \qquad \text{in } \Delta t = 2.0\ s$

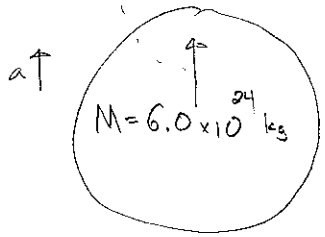
$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{\Delta t} = +0.50\ m/s^2$

$F_{net} = ma = (1500\ kg)(0.50\ m/s^2) = \boxed{750\ N}$

8:

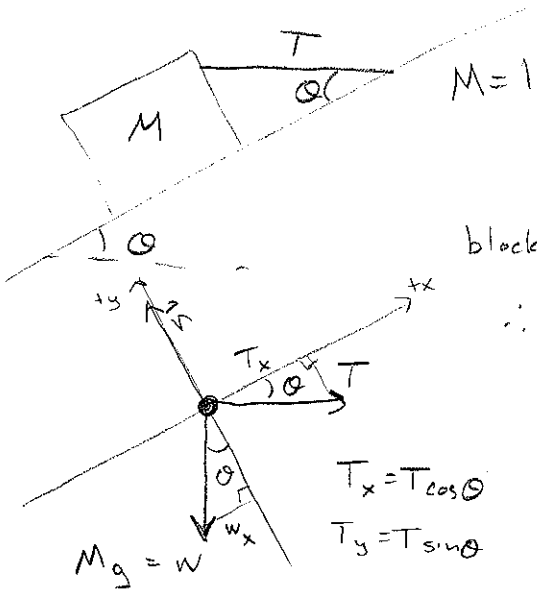
$m = 60.\ kg$

$w = mg = 588N$ = Force on you from Earth
= Force on Earth from You



$\therefore \sum F_y = Ma = mg \Rightarrow a = \left(\frac{m}{M}\right)g = \boxed{9.8 \times 10^{-23}\ m/s^2}$

9:



$M = 19\ kg \quad \theta = 17°$

block in equilibrium, take tilted C.S.

$\therefore \sum F_x = 0 = T_x - w_x$

$= T\cos\theta - Mg\sin\theta$

$\therefore T\cos\theta = Mg\sin\theta$

$T = Mg\tan\theta = \boxed{57N}$

$T_x = T\cos\theta$

$T_y = T\sin\theta$

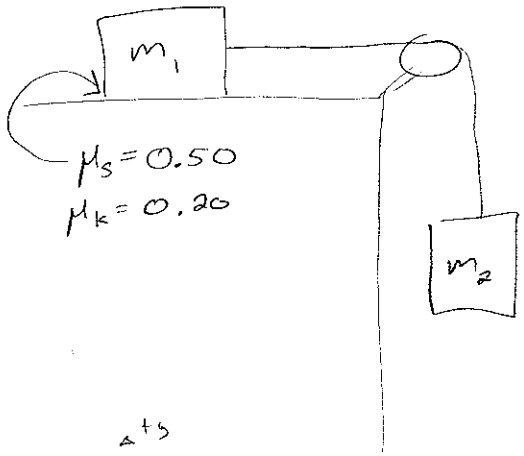
$Mg = w$

$w_x = w\sin\theta$

$w_y = w\cos\theta$

Long Answer Problem is worth 10 points. Please show your work, and clearly designate your answer. Partial credit may be given.

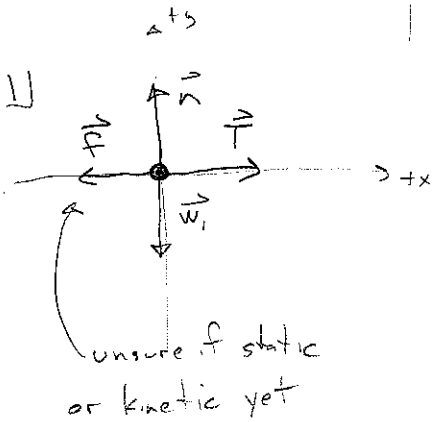
10:



$m_1 = 100.\ kg$ $m_2 = 2,000\ kg$

first block "rests" on surface
$\Rightarrow$ initially at rest.

a) 1]



2]

No third law pairs since blocks aren't in contact with each other

(do have same tension throughout rope)

b) $\sum_1 F_y = n - w_1 = 0$

$\therefore n = w_1 = m_1 g = \boxed{980.\ N}$

c) Don't know yet if system is moving, but it starts at rest, so let's see if it would move

$\sum_2 F_y = T - w_2 = 0 \Rightarrow T = w_2 = m_2 g = \boxed{19.6\ N}$

If block 1 is to remain stationary, $T \leq f_{s,max} = \mu_s n = 490.\ N$, which it is.

Since it's below threshold, $f = f_s = T = 19.6\ N$, and both blocks are in equilibrium

d) $\vec{a}_1 = 0$

e) $\vec{a}_2 = 0$

} because they're in equilibrium