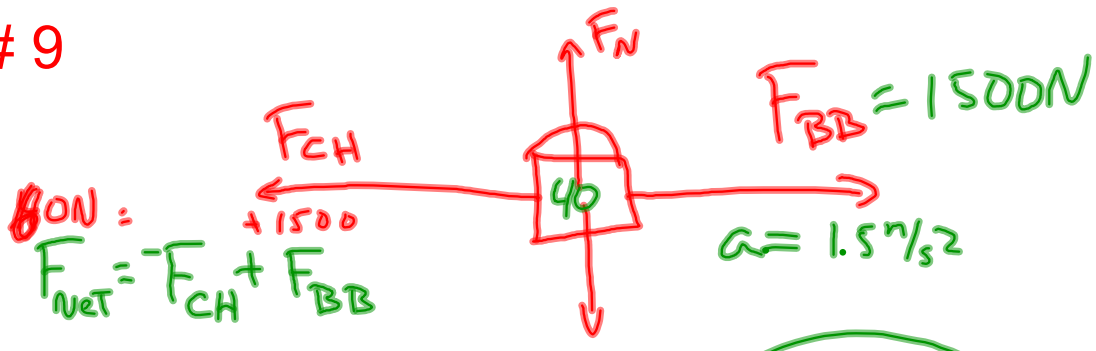
9



+1500

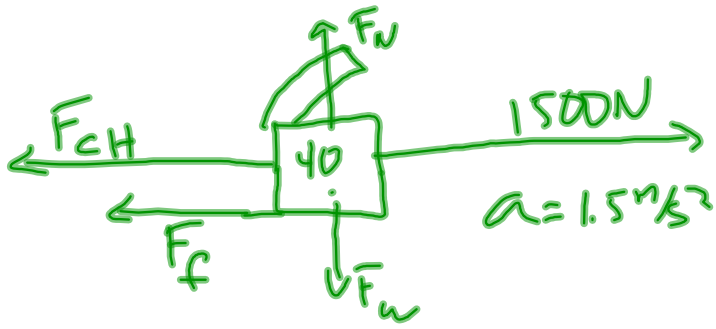
$F_{Net} = -F_{CH} + F_{BB}$

$F_{Net} = ma$

$60N = 40(1.5 m/s^2)$

$-1440N$

#10)



$\mu = 0.165$

$F_{Net} = F_{BB} - F_{CH} - F_f$

$60N = 1500N - F_{CH} - \mu F_N$

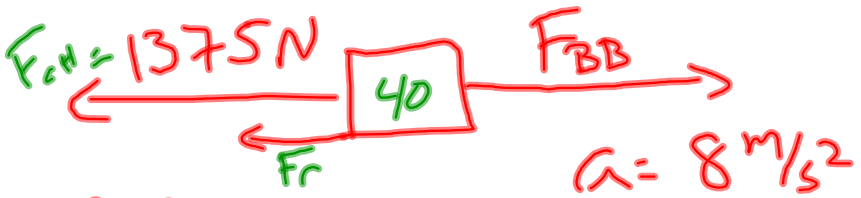
$(.165)(40)(9.81)$

64.68

$F_{CH} = -1564.7N$

$-1375N$

11



$\mu = 0.085$

$F_N = 40(9.81)(.085) = F_f$

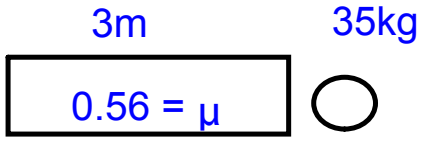
$F_{Net} = F_{BB} - F_{cH} - F_f$

$40(8) = 320N$

$320N = F_{BB} - 1375N - 33.3N$

$F_{BB} = 1728N$

13



$F_f = 0.56\ (35kg)(9.81m/s^2)$

$F_f = 192N$

$F_a = 8700N$

$F_{tot} = F_a - F_f$

$F_{tot} = 8700N - 192N = 8508N$

$8508N = 35kg(a) = 243\ m/s^2$

$V_f^2 = 0 + 2(243\ m/s^2)(3m) = 38.2\ m/s$

$0.035 = \mu$ $F_f = 0.035\ (35kg)(9.81m/s^2) = -12N$

$F_{tot} = F_f$

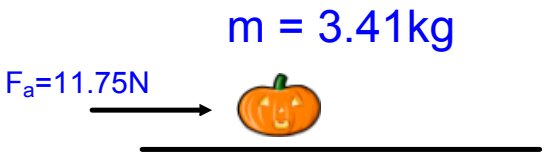
$-12N = 35kg\ (a)$ $a = -0.34m/s^2$

$0^2 = (38.2\ m/s)^2 + 2(-0.34\ m/s^2)(\Delta x)$

$\Delta x = 2145m$

2 Hutto

a) 3.41kg × 9.81m/s^2 = 33. 4N



b) -33.4N

c) -11.75N constant speed $F_f = F_a$

d) no acceleration $F_f = F_a$

e) $F_f = \mu F_N$

-11.75N = μ (3.41kg)(-9.81m/s^2)

μ= 0.35

$m = 1500kg\,(9.81) = 15206N$

$\Delta x_1 = 80m \quad t = 11.65\,sec \quad \mu = 0.125$

$80m = 0 + \frac{1}{2}(a)(11.65)^2 \approx 1.2\,m/s^2$

$13.7\,m/s$

$V_f = V_i + at$

$V_f^2 = V_i^2 + 2a\Delta$

$V_f = +0.2(11.6$

$V_f^2 + 2(1.2)(8$

$V_i = 7.4\,m/s \quad \Delta x_2 = 120m$

$\Delta x = V_i t = 16\,sec$

$\Delta x_3 = 100m \quad t_3 = 2.5\,sec$

$100m = 7.4(2.5) + \frac{1}{2}(a)(2.5)^2$

$V_i = 7.4\,m/s$

$\Delta x = 100m$

$t = 2.5\,sec$

$\parallel \quad 2015N = F$

$a = 26\,m/s^2$

$\Delta x_4 = 150m \quad V_f = 0 \quad \mu = 0.256$

$F_f = \mu F_N$

$V_f = 7.4 + 26(2.5$

$V_f = 72\,m/s$

Dare Devil Nick

a) $W = 1500kg\ (9.81\ m/s^2) = 15206N$

b) $80m = 0 + 1/2(a)(11.65\ sec)^2 \quad a = 1.2\ m/s^2$

c) $V_f = 0 + 1.2m/s^2(11.65\ sec) \quad v_f = 13.98\ m/s$

d) $F_f = \mu F_N \quad = 0.125(1550)(9.81\ m/s^2)$ assume wind and sliding are equivalent

e) $7.4m/s = 120m/\Delta t \quad = 16.2\ sec$

f) $0\ m/s^2$ constant velocity

g) $100m = 7.4m/s(2.5\ sec) + 1/2(a)(2.5\ sec)^2 \quad = 26\ m/s^2$

h) $V_f = 7.4m/s + 26\ m/s^2(2.5\ sec) \quad = 72\ m/s$

i) $2015N = 1550kg\ (a)\ 1.3\ m/s^2$

j) $V_f^2 = (72m/s)^2 + 2(26m/s^2)(100m) \quad = 101.9\ m/s$

K) $0 = (101.9\ m/s)^2 + 2(a)(150m) \quad = -34.6\ m/s^2$

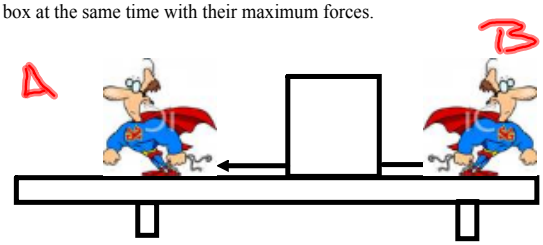
k2) $F_f = 0.256(1550kg)(-9.81m/s^2) = -3892.6\ N$

4. A 15kg box sits on a table. Two ropes are attached to the box on opposite sides. . The coefficient of sliding friction between the box and the table is 0.235. Each boy practices pulling on the box and Boy A is able to accelerate the box at a rate of 20 m/s^2 without friction, Boy B pulls is able to pull with a force of 200N. Boy A grabs rope A and Boy B grabs rope B. They then pull on the box at the same time with their maximum forces.

a. What is the mass of the box?
b. What is the weight of the box?
c. What is the acceleration due to gravity acting on the box?
d. What is F_N?
e. What is the force of friction?
f. How much force did Boy A apply to the box?
g. What is the total force acting on the box as Boy A pulls on it(with friction)?
h. What is the acceleration of the box caused by Boy B? Assume friction free.

Now they are both pulling

i. What is the total force acting on the box as both boys pull and friction is involved?
j. Towards which boy will the box move?
k. At what rate will it accelerate towards that boy?
l. After 5 seconds what is the velocity of the box?
m. After 5 seconds how far has the box moved?



a. 15kg

b. 15kg *9.81

c. 9.81 m/s^2

d. 147N

e. 34.6N

f. 300N

g. 265.4N

h. 13.3 m/s^2

i. 65.4N

j. A

k. 4.3 m/s^2

l. 21.8 m/s

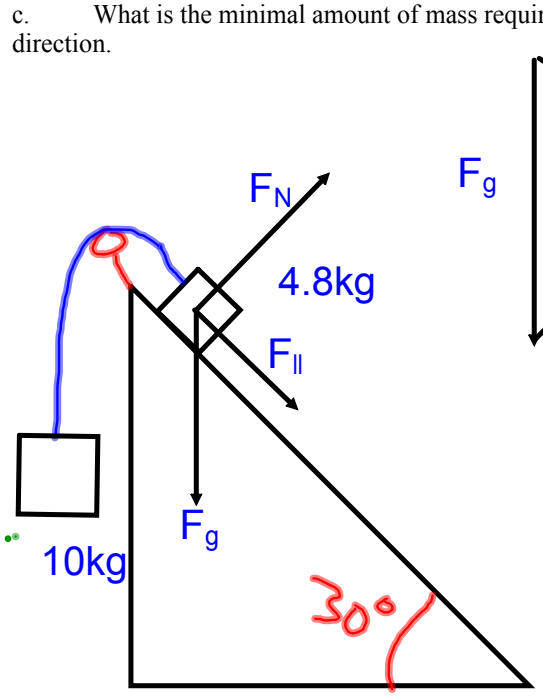
m. 54.5m

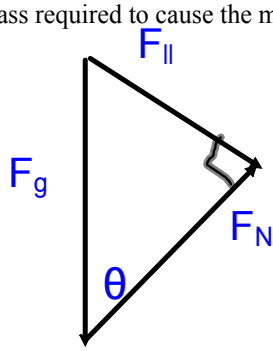
5. Two masses are connected by a light string passing over a pulley. The inclined surface is frictionless, and the effects of the pulley can be ignored. The mass of $mass_1$= 10 kg and $mass_2$ = 4.8 kg. The angle for the ramp is $\theta = 30^o$.

a. Find the acceleration of the $mass_1$.

b. Assume that the surface has a coefficient of friction of .025, what is the acceleration of the mass?

c. What is the minimal amount of mass required to cause the $mass_1$ to move in the opposite direction.





$F_{||}$= 47N Sin(30) =23.5N

F_N= 47N Cos(30) = 40.7N

$F_T = F_{||} - F_g = 23.5 - 98.1N$

$F_T = (m_1 + m_2)a = (10 + 4.8)a$

$-74.6\ N = (10 + 4.8)a$

a. $-5.04\ m/s^2$

$F_T = F_{||} - F_g + F_f$

$F_f = \mu F_N = 1.02N$

$F_T = 23.5 + 1.02N - 98.1N \quad F_T = -73.6N$

b.) $-73.6N = 14.8kg(a) = -4.97\ m/s^2$

c.) $-73.6N = m(9.81)\sin(30) = 15\ kg$

15kg + 4.8 = 19.8kg

8)

a) 17.7kg

b) 13.5N

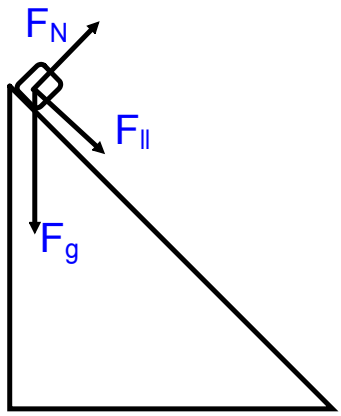
c) 11.35N

d) 6.3 m/s^2

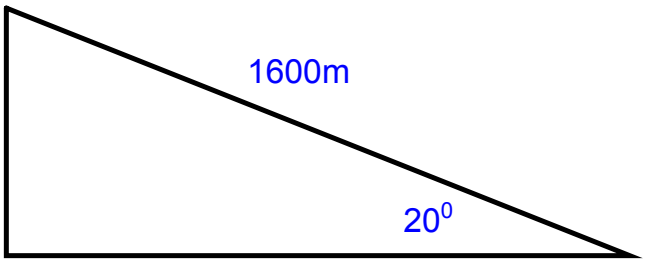
e) 4.3 m/s

f) 4.4 m/s^2

g) 3.6 m/s



9)



$F_w = 200N$

a) $90*9.81 = 883N$

b) $90*9.81\cos(20) = 829.7N$

c) $90*9.81\sin(20) = 302N$

d) $F_{net\ or\ T} = 302N - 200N = 102N$

e) $102N = 90(a) = 1.1\ m/s^2$

f) $v_f^2 = 0 + 2(1.1\ m/s^2)1600m = 60\ m/s$

g) $F_T = ma = \mu F_N = .075\ (883N) = 66.2N = 90(a) = .735\ m/s^2$

$(60\ m/s)^2 = 0^2 + 2(0.735 m/s^2)\Delta x = 2448m$

Ramp

a. 441N $45(9.81)$

b. 348N $F_N = 45(9.81)\cos(38^\circ)$

c. 272N $F_{||} = 45(9.81)\sin(38^\circ)$

d. 6 m/s^2 $272N = 45kg(g)$

Ramp

e. 4.88m/s2 $F_T = F_{11} - F_f$

$272 - 52 = 220$

$220 = 45(a)$

f. 52N

g. 12.1m/s

$V_f^2 = V_i^2 + 2(4.88)(15)$

h. 110N

$45kg(9.81)(.25)$

Ramp

$F_f = F_T$

i. 2.4 m/s2 $110N = 45(a)$

j. 11.1 m/s $V_f^2 = 12.1^2 + 2(-2.4)(5)$

k. 24.3 m no friction

$F_{11} = 45(9.81)\sin 15^\circ$

$F_{11} = 114N$

$114N = 45(a)$

$0^2 = 11.1^2 + 2(-2.53)(\Delta x)$