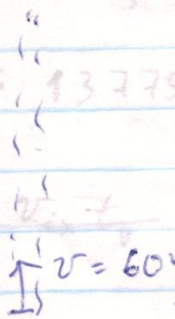
2)



$y_f = y_i + v_{iy}t + \frac{1}{2}a_y t^2$ $\quad v_f = v_i + a_y t$

y_f(m)	t(s)
100	2
160	4
180	6
160	8
0	12

v_f(m/s)	t(s)
40	2
20	4
0	6
-20	8
-60	12

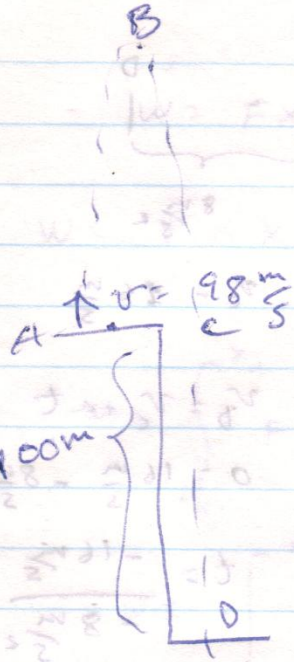
$y_{mx} = 60\frac{m}{s}t + \frac{1}{2}(10\frac{m}{s^2})t^2$

$v_{fmx} = v_i - at \Rightarrow 0 = v_i - at \Rightarrow t = \frac{-v_i}{-a} = \frac{-60\,m/s}{-10\,m/s^2} = 6s.$

$y_{mx} = 60\frac{m}{s}(6s) - \frac{1}{2}(10\frac{m}{s^2})(6s)^2 = 180\,m.$

$t_v = 2t_{mx} = 2(6s) = 12\,s.$

(3)



$$y_{mx} = y_i + v_{iy} t + \frac{1}{2} a_y t^2$$

$$v_{fmx} = v_i + a_y t_{mx}$$

$$0 = 98 \frac{m}{s} - 9{,}8 \frac{m}{s^2} t_{mx}$$

$$t_{mx} = 10\,s$$

$$y_{mx} = 98 \frac{m}{s}(10s) - \frac{1}{2}\left(9{,}8 \frac{m}{s^2}\right)(10s)^2$$

$$= 490\,m.$$

maxima altura que alcanza medida desde el suelo.

$$y_{mx} = 490\,m + 100\,m = 590\,m.$$

$$t_{ABC} = \cancel{v_f} = 2 t_{mx} = 20s$$

$$v_f^2 = v_i^2 + 2 a_y (y_f - y_i).$$

$$\sqrt{v_f} =$$

de C a D

$$y = y_i + v_{iy} t + \frac{1}{2} a_y t^2$$

$$-100\,m = -98 \frac{m}{s} t - \frac{1}{2}\left(9{,}8 \frac{m}{s^2}\right) t^2$$

$$0 = 100\,m - 98 \frac{m}{s} t - 4{,}9 \frac{m}{s^2} t^2$$

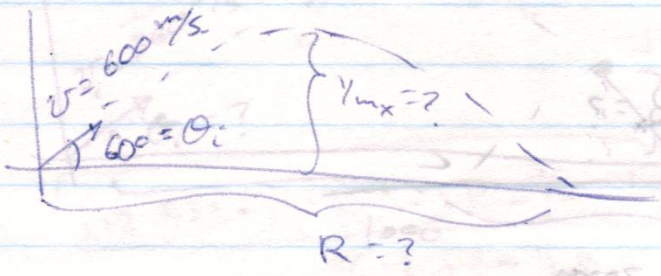
$$t = \frac{98 \pm \sqrt{(98)^2 - 4(-4{,}9)(100m)}}{2.(-4{,}9)} = \frac{98 \pm \cancel{\sqrt{}}\ 107{,}54}{-9{,}8}$$

$\sqrt{11504}$

$$t_1 = \frac{98 + 107{,}54}{-9{,}8} = -20{,}973\,s \qquad t_2 = \frac{98 - 107{,}54}{-9{,}8} = 0{,}973\,s$$

$$t_v = t_{ABC} + t_{CD} = 20s + 0{,}973\,s = 20{,}973\,s.$$

4



$$Y_{max} = Y_i + v_{iy} t + \frac{1}{2} a_y t^2$$

$$Y_{max} = 600\ m/s\ sen(60°)\ t_{max} - \frac{1}{2}(9{,}8\ m/s^2)\ t_{max}^2$$

$$v_{f\,max} = v_{iy} + a_y t_{max}$$

$$0 = 600\ m/s\ sen(60°) - 9{,}8\ m/s^2\ t_{max}$$

$$t_{max} = 53{,}022\ s$$

$$Y_{max} = 600\ \frac{m}{s}\ sen(60°)\ (53{,}022\ s) - \frac{1}{2}\left(9{,}8\ \frac{m}{s^2}\right)(53{,}022\ s)^2$$

$$= 13775{,}51\ m.$$

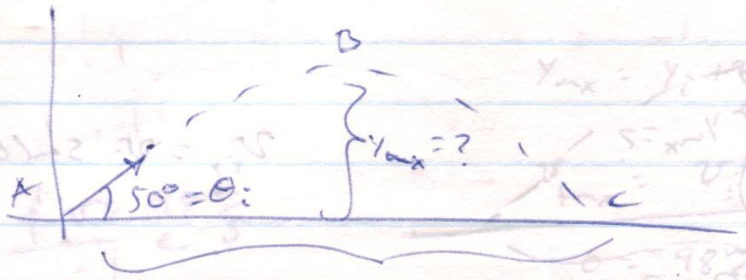
$R = v_{ix} t_v$ $\quad X_f = X_i + v_{ix} t + \frac{1}{2} a_x t^2$

$$R = v_i \cos(60)\ t_v \qquad t_v = 2\, t_{max}$$

$$R = 600\ \frac{m}{s} \cos(60°)\ (106{,}044\ s) \qquad = 106{,}044\ s.$$

$$= 31.813{,}2\ m.$$

(5)



$R = 20m$

$x_f = x_i + v_{ix} t + \frac{1}{2} a_x t^2$.

$A \to C$

$R = v_i \cos(\theta_i) t_v$

$20m = v_i \cos(50°) t_v$

$t_v = 2 t_{max}$

$20m = v_i \cos(50°) 2 t_{max}$

$20m = v_i \cos(50°) 2 \frac{v_i \sin(50°)}{9,8 m/s^2}$

$\frac{196 m^2/s^2}{0,984808} = v_i^2 \Rightarrow v_i = 14,11 m/s$.

$A \to B$.

$y_f = y_i + v_{iy} t + \frac{1}{2} a_y t^2$.

$v_{fy} = v_{iy} + a_y t$

$0 = v_i \sin(\theta_i) - 9,8 t_{max}$.

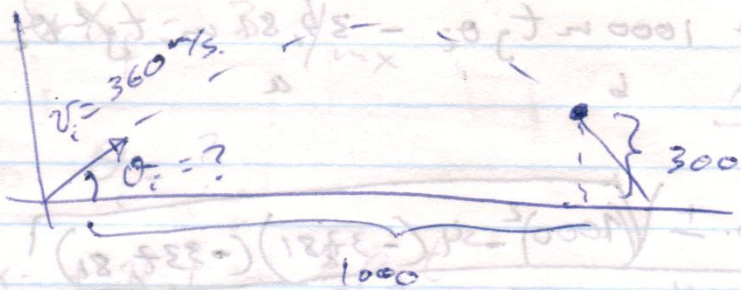
$t_{max} = \frac{v_i \sin(50°)}{9,8 m/s^2}$

$t_{max} = \frac{14,11 m/s \sin(50°)}{9,8 m/s^2} = 1,1035 s$

$y_{max} = (14,11 m/s) \sin(50) (1,1035 s) - \frac{1}{2} (9,8 m/s^2) (1,1035 s)^2$.

$= 5,961 m$ //

(6)



$$y_f = y_i + v_{iy} t + \frac{1}{2} a_y t^2$$

$$300m = 360\,m/s \sin(\theta_i)\, t - \frac{1}{2}(9{,}8\,m/s^2)\, t^2$$

$$x_f = x_i + v_{ix} t + \frac{1}{2} a_x t^2$$

$$1000m = 360\,m/s \cos(\theta_i)\, t$$

$$t = \frac{1000\,m}{360\,m/s \cos(\theta_i)}$$

$$300m = 360\,m/s \sin(\theta_i) \frac{1000\,m}{360\,m/s \cos\theta_i} - \frac{1}{2} 9{,}8\,m/s^2 \left(\frac{1000\,m}{360\,m/s \cos\theta_i} \right)^2$$

$$300m = 1000m\, tg(\theta_i) - 37{,}81\,m \frac{1}{\cos^2\theta_i}$$

$$\frac{1}{\cos^2\theta_i} = \sec^2\theta_i$$

$$\sec^2\theta_i = 1 + tg^2\theta_i$$

$$0 = -300\,m + 1000m\, tg(\theta_i) - 37{,}81\,m \left(1 + tg^2\theta_i\right)$$

$$0 = -300\,m + 1000\,m\, tg(\theta_i) - 37{,}81\,m - 37{,}81\,m\, tg^2\theta_i$$

$$0 = -300m - 37{,}81m + 1000m\, tg(\theta_i) - 37{,}81\,m\, tg^2\theta_i$$

$$0 = -337,81\,m + 1000\,m\,tg\,\theta_i - 37,81\,m\,tg^2\theta_i$$

$$c \qquad b \qquad a$$

$$tg\,\theta_i = \frac{-1000 \pm \sqrt{(1000)^2 - 4(-37,81)(-337,81)}}{2(-37,81)}$$

$$= \frac{-1000 \pm 974,1199}{-75,62}$$

$$= \frac{-1000 - 974,1199}{-75,62} = \frac{-1974,1199}{-75,62} = 26,106$$

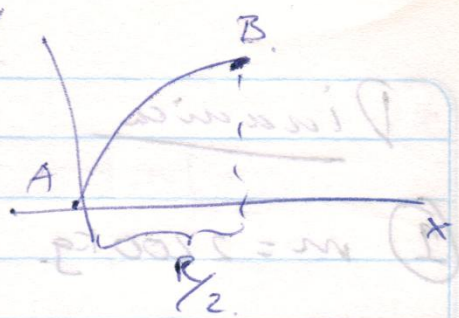
$$\theta_i = arctg\,(26,106) = 87,81^\circ$$

$$= \frac{-1000 + 974,1199}{-75,62} = 0,342239$$

$$\theta_i = arctg\,(0,342239) = 18,89^\circ$$

(7) $R = X_f = 3\, y_{max}$

$\theta_i = ?$



$x_f = x_i + v_{ix} t + \frac{1}{2} a_x t^2$

$A \to B$

$R = v_i \cos(\theta_i)\, t_{max}$ (1)

$t_{max} = \frac{R}{2 v_i \cos(\theta_i)}$

$y_f = y_i + v_{iy} t + \frac{1}{2} a_y t^2$

$y_{max} = v_i \operatorname{sen}\theta_i\, t_{max} - \frac{1}{2} g t_{max}^2$

$y_{max} = \frac{R}{3}$

$\frac{R}{3} = v_i \operatorname{sen}(\theta_i)\, t_{max} - \frac{1}{2} g t_{max}^2$ (2)

$v_{fy} = v_{iy} - g t_{max}$

$0 = v_i \operatorname{sen}(\theta_i) - g t_{max}$

$t_{max} = \frac{v_i \operatorname{sen}(\theta_i)}{g}$ (3)

3 en 1 y 2

$\frac{R}{2} = \frac{v_i^2 \cos(\theta_i) \operatorname{sen}(\theta_i)}{g}$

$R = \frac{2 v_i^2 \cos(\theta_i) \operatorname{sen}(\theta_i)}{g}$

$\frac{R}{3} = \frac{v_i^2 \operatorname{sen}^2(\theta_i)}{g} - \frac{1}{2} \frac{v_i^2 \operatorname{sen}^2\theta_i}{g}$

$\frac{R}{3} = \frac{1}{2} \frac{v_i^2 \operatorname{sen}^2\theta_i}{g}$

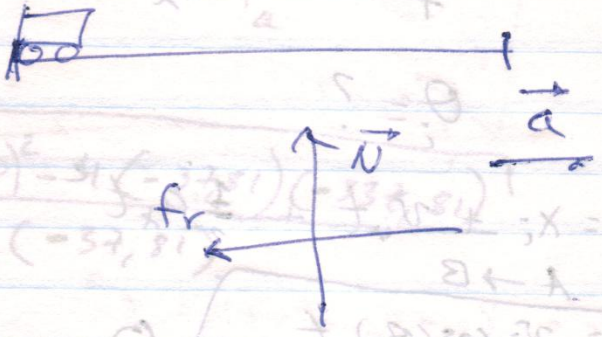
$R = \frac{3}{2} \frac{v_i^2 \operatorname{sen}^2\theta_i}{g}$

$R = R$

$\frac{2 v_i^2 \cos\theta_i \operatorname{sen}(\theta_i)}{g} = \frac{3}{2} \frac{v_i^2 \operatorname{sen}^2\theta_i}{g}$

$tg\,\theta_i = \frac{4}{3} \Rightarrow \theta_i = \operatorname{arctg}\left(\frac{4}{3}\right) = 53{,}13^\circ$

Dinamica



(1) $m = 2200\ kg.$

$v = 32\ m/s$

$F = 6000\ N$

$x_f = ?$ (Despues de aplicar frenos)

$-f_r = ma$

$-\frac{f_r}{m} = a$

$a = -2,72727\ m/s^2.$

$v_i = 32\ m/s.$

$v_f = 0$

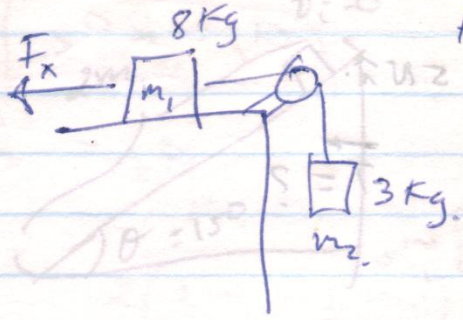
$v_f = v_i + a_x t$ $\qquad x_f = x_i + v_{ix} t + \frac{1}{2} a_x t^2.$

$0 = 32\ m/s - 2,72727\ m/s\ t$

$t = \frac{32}{2,72727}\ s = 11,73335\ s.$

$x_f = 32\ m/s\,(11,73335\ s) - \frac{1}{2}(2,72727\ m/s^2)(11,73335\ s)^2$

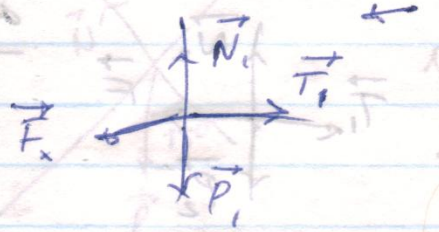
$= 187,73\ m.$

(2) 

$F_x = 2\,N$

$T = ?$

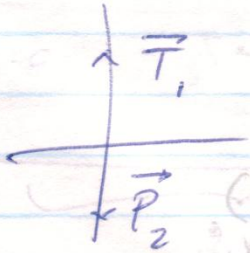
m_1



$$-F_x + T_1 = -m_1 a$$

$$F_x - T_1 = m_1 a \quad (1)$$

m_2



$$T_1 - P_2 = m_2 a \quad (2)$$

(con 1 y 2

$$F_x - T_1 = m_1 a$$

$$T_1 - P_2 = m_2 a$$

$$F_x - P_2 = a(m_1 + m_2) \Rightarrow a = \frac{F_x - m_2 g}{m_1 + m_2}$$

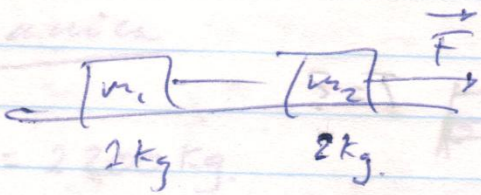
$$a = \frac{2N - (3Kg \times 10\,m/s^2)}{(8Kg + 3Kg)} = \frac{2N - 30N}{11Kg}$$

$$a = \frac{-28N}{11Kg} = -2,545454\,m/s^2$$

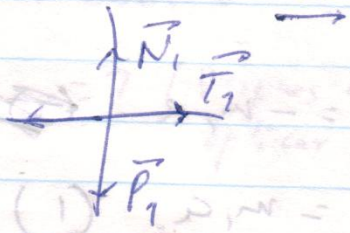
$$T = m_1 a + F_x = -8Kg(-2,545454\,m/s^2) + 2N =$$

$\vec{a} = ?$

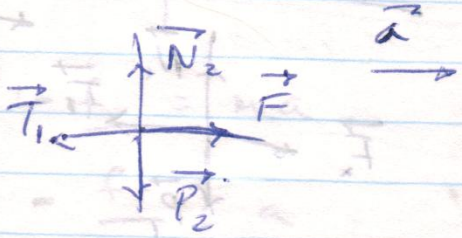
(3)



para m_1



m_2



$T_1 = m_1 a$ $\quad -T_1 + F = m_2 a$

$T_1 = m_1 a$

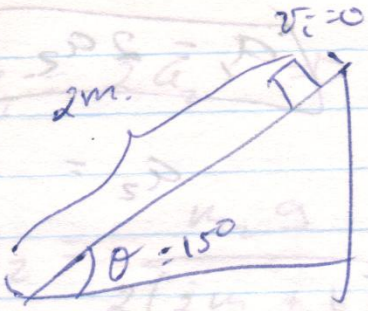
$-T_1 + F = m_2 a$

$F = a(m_1 + m_2)$.

$$a = \frac{F}{m_1 + m_2} = \frac{5N}{3kg} = 0,6\ m/s^2.$$

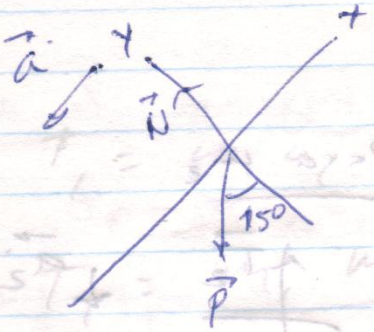
$T_1 = m_1 a \Rightarrow T_1 = 1kg(0,6\ m/s^2) = 0,6N$

(4)



$a = ?$

$v_f = ?$



$N - P_y = 0$

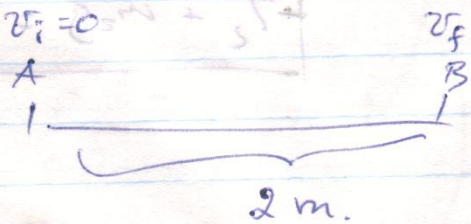
$N - mg\cos(\theta) = 0$

$-P_x = -ma$

$-mg\,\mathrm{Sen}(\theta) = -ma$

$g\,\mathrm{Sen}(\theta) = a$

$a = -9{,}8\ m/s^2\ \mathrm{Sen}(15^\circ) = 2{,}5364\ m/s^2$



$v_f = v_i + at$

$v_f = 2{,}5364\ m/s^2\, t$

$x_f = x_i + v_{ix}t + \frac{1}{2}a_x t^2$

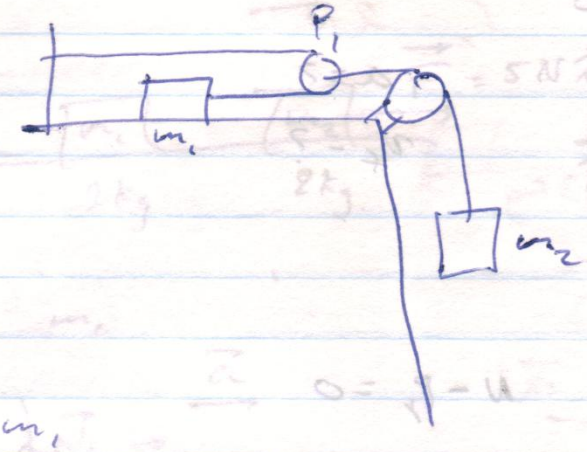
$2m = v_i t^{0} + \frac{1}{2}(2{,}5364\ m/s^2)\,t^2$

$t = \sqrt{\frac{4m}{2{,}5364\ m/s^2}} = 1{,}2558\ s$

$v_f = 2{,}5364\ m/s^2\,(1{,}2558\ s)$

$v_f = 3{,}1852\ \frac{m}{s}$

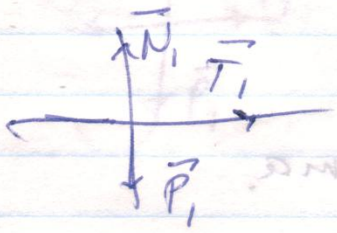
(5)



$a_1 = 2a_2$

$a_2 = \frac{a_1}{2}$

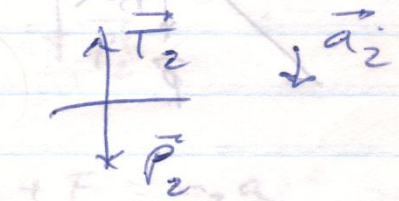
Para m_1



$T_1 = m_1 a_1$ (1)

$N_1 - P_1 = 0$

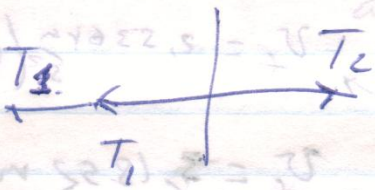
Para m_2



$T_2 - P_2 = -m_2 a_2$

$T_2 + m_2 g = m_2 a_2$ (2)

para polea 1



$-T_1 - T_1 + T_2 = 0$

$T_2 = 2T_1$ (3)

$T_1 = m_1 a_1 \Rightarrow 2T_1 = 2m_1 a_1$

$-2T_1 + m_2 g = m_2 \frac{a_1}{2} \Rightarrow -2T_1 + m_2 g = \frac{m_2 a_1}{2}$

$m_2 g = a_1 \left(2m_1 + \frac{1}{2} m_2\right)$

$a = m_2 g / \left(2m_1 + \frac{m_2}{2}\right)$

$a_1 = 2a_2 \Rightarrow a_2 = \frac{a_1}{2}$

$a_2 = \frac{m_2 g}{2\left(2m_1 + \frac{1}{2}m_2\right)} \Rightarrow a_2 = \frac{m_2 g}{4m_1 + m_2}$

$T_1 = m_1 a_1$

$T_1 = \frac{m_1 m_2 g}{2m_1 + \frac{m_2}{2}}$

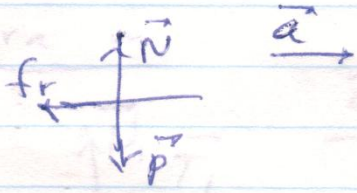
$T_2 = 2T_1$

$T_2 = \frac{2(m_1 m_2 g)}{2m_1 + \frac{m_2}{2}}$

(6) un juego de tejo.

$v_i = 5\ m/s$

$\mu = ?$



$-f_r = ma$

$N - P = 0$

$N = mg$

$-\mu N = ma$

$-\mu mg = ma$

$-\mu g = a$

$\mu = \frac{-a}{g}$

$\mu = \frac{-(-1,5625\ m/s^2)}{9,8\ m/s^2}$

$\mu = 0,159$ //

buscando la aceleración.

$v_{fx} = v_{ix} + a_x t$

$x_f = x_i + v_{ix} t + \frac{1}{2} a_x t^2$

$0 = 5\ m/s + a_x t$

$8\ m = 5\ m/s\ t + \frac{1}{2} a_x t^2$

$a_x = \frac{-5\ m/s}{t}$

$8\ m = 5\ m/s\ t + \frac{5}{2t} t^2$

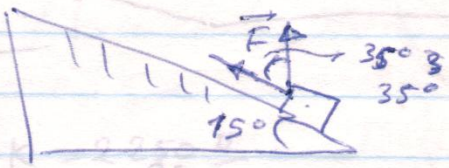
$8\ m = 5\ m/s\ t - 2,5\ m/s\ t$

$8\ m = 2,5\ m/s\ t$

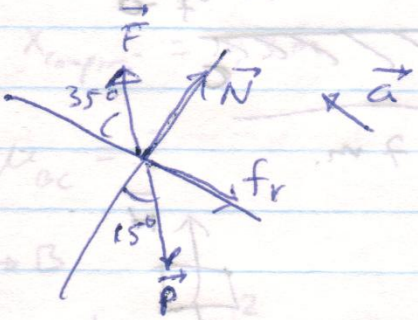
$t = \frac{8}{2,5}\ s = 3,2\ s$

$a_x = \frac{-5\ m/s}{3,2\ s} = -1,5625\ m/s^2$

(7) $P = 60N$ $F = 25N$ $\mu = ?$



Sube con rapidez cte $\Rightarrow a = 0$



~~$N - P_y = 0$~~

~~$N - mg\cos(15°) = 0$~~

$N - P_y + F_y = 0$

$N - P\cos(15°) + F\sin(35°) = 0$

$N = P\cos(15°) - F\sin(35°)$

$-F_x + P_x + f_r = -ma$

$-F\cos(35°) + P\sin(15°) + \mu N = -ma$

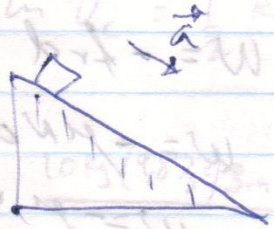
$-F\cos(35°) + P\sin(15°) + \mu(P\cos(15°) - F\sin(35°)) = -ma$

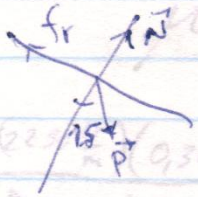
$$\mu = \frac{F\cos(35°) - P\sin(15°)}{P\cos(15°) - F\sin(35°)} = \frac{25N\cos(35) - 60N\sin(15°)}{60N\cos(15) - 25N\sin(35)}$$

4,9449658401

43,616 13867

$\mu = 0,1135$





$N - P_y = 0$

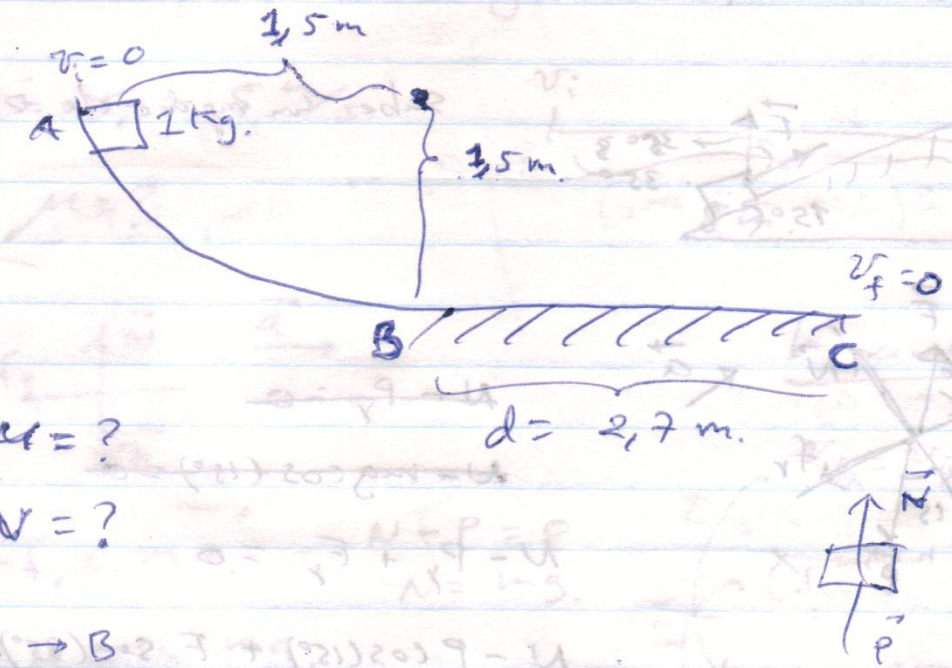
$N = P\cos(15) = 57,96N$

$-f_r + P\sin(15) = ma$

$$a = \frac{-0,1135(57,96N) + 60N\sin(15)}{\left(\frac{60}{9,8}\right)kg} \qquad \frac{-\mu N + P\sin(15)}{m} = a$$

$= 1,4619\ m/s^2$

Energía.

1) 

$\mu = ?$

$W = ?$

$A \rightarrow B$

$$mgh = \frac{1}{2} m v_B^2$$

$$gh = \frac{1}{2} v_B^2$$

$B \rightarrow C$

$$-\frac{1}{2} m v_B^2 = -fr\, d$$

$$-\frac{1}{2} m v_B^2 = -\mu N d$$

$$\frac{1}{2} m v_B^2 = \mu mg d$$

$$\frac{1}{2} v_B^2 = \mu g d$$

$$gh = \mu g d$$

$$\mu = \frac{h}{d} = \frac{1,5m}{2,7m} = 0,56$$

$N = P$

$N = mg.$

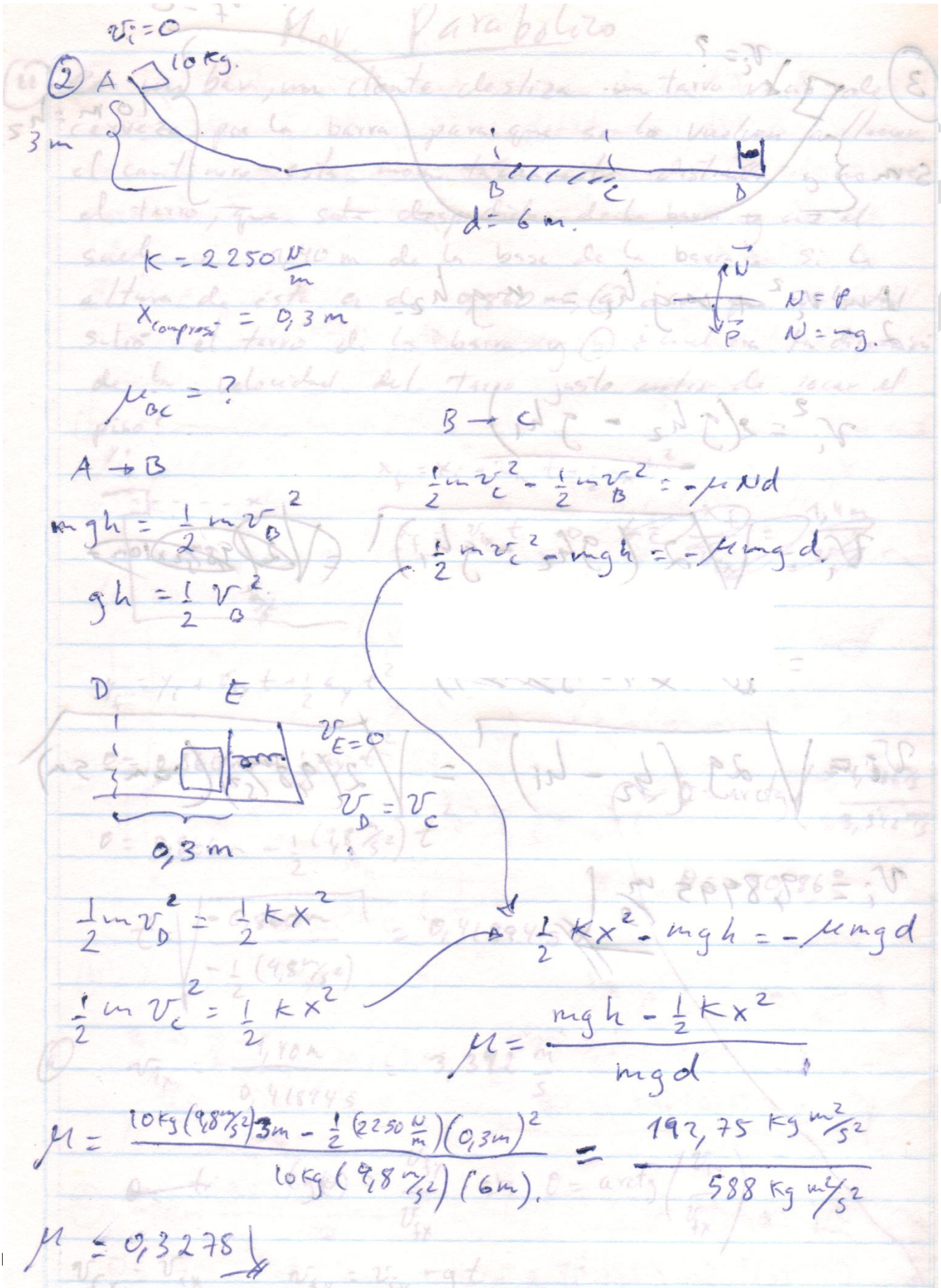
$W = -fr\, d$

$W = -\mu N d$

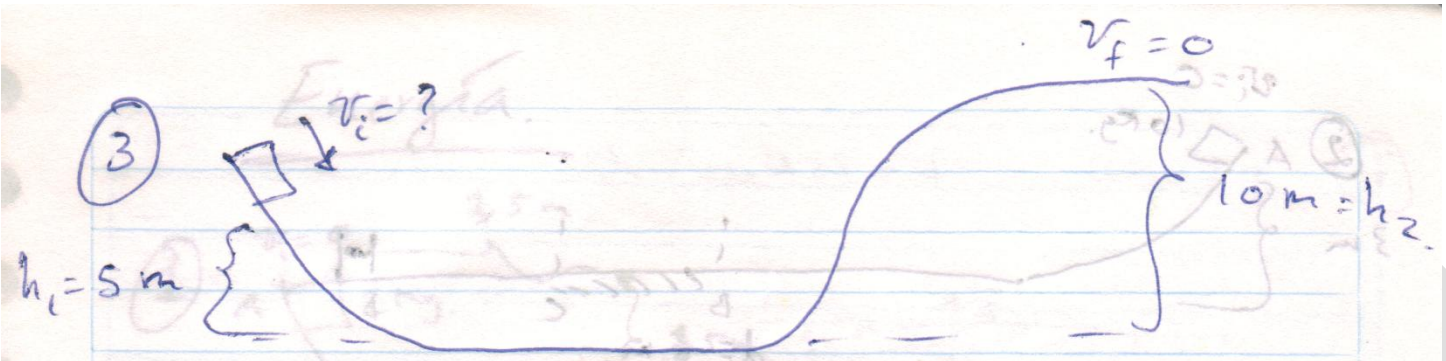
$W = -\mu . mg d$

$W = 0,56 (9,8N) 2,7m$

$W = -14,82 Nom$


$v_i = 0$
② A
10 Kg.
3 m
B
C
D
d = 6 m.
K = 2250 N/m
$x_{compresión} = 0,3\ m$
$\mu_{BC} = ?$
$\vec{N}$
$\vec{P}$
N = P
N = mg.
A → B
$mgh = \frac{1}{2} m v_B^2$
$gh = \frac{1}{2} v_B^2$
B → C
$\frac{1}{2} m v_C^2 - \frac{1}{2} m v_B^2 = -\mu N d$
$\frac{1}{2} m v_C^2 - mgh = -\mu mg d$
D E
$v_{E=0}$
$v_D = v_C$
0,3 m
$\frac{1}{2} m v_D^2 = \frac{1}{2} k x^2$
$\frac{1}{2} m v_C^2 = \frac{1}{2} k x^2$
$\frac{1}{2} k x^2 - mgh = -\mu mg d$
$\mu = \frac{mgh - \frac{1}{2} k x^2}{mgd}$
$\mu = \frac{10Kg(9,8 m/s^2)3m - \frac{1}{2}(2250 N/m)(0,3m)^2}{10Kg(9,8 m/s^2)(6m).} = \frac{192,75\ Kg\ m^2/s^2}{588\ Kg\ m^2/s^2}$
$\mu = 0,3278$

(3)



$$\frac{1}{2} m v_i^2 + mg h_1 = mg h_2$$

$$v_i^2 = 2(g h_2 - g h_1)$$

$$v_i = \sqrt{2(g h_2 - g h_1)}$$

$$v_i = \sqrt{2g(h_2 - h_1)} = \sqrt{2(9{,}8\,m/s^2)(10\,m - 5\,m)}$$

$$v_i = 9{,}8995\ m/s$$ //