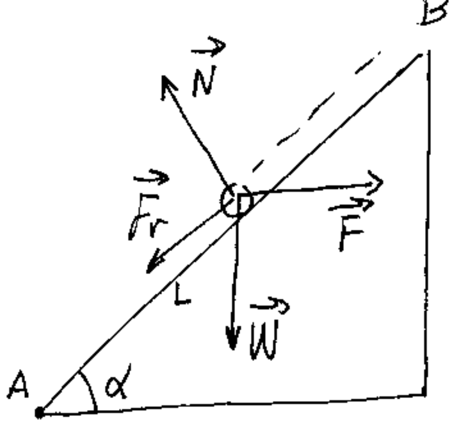


$$\left.\begin{aligned} m\,a &= F\cos\alpha - mg\,\text{sen}\,\alpha - F_r \\ 0 &= N - mg\cos\alpha - F\,\text{sen}\,\alpha \\ F_r &= \mu \cdot N \end{aligned}\right\}$$

$F = 100\ \text{m/s}^2$

$$m \cdot a = F\cos\alpha - mg\,\text{sen}\,\alpha - \mu(mg\cos\alpha + F\,\text{sen}\,\alpha)$$

$$a = \frac{1}{m} F(\cos\alpha - \mu\,\text{sen}\,\alpha) - g(\text{sen}\,\alpha + \mu\cos\alpha)$$

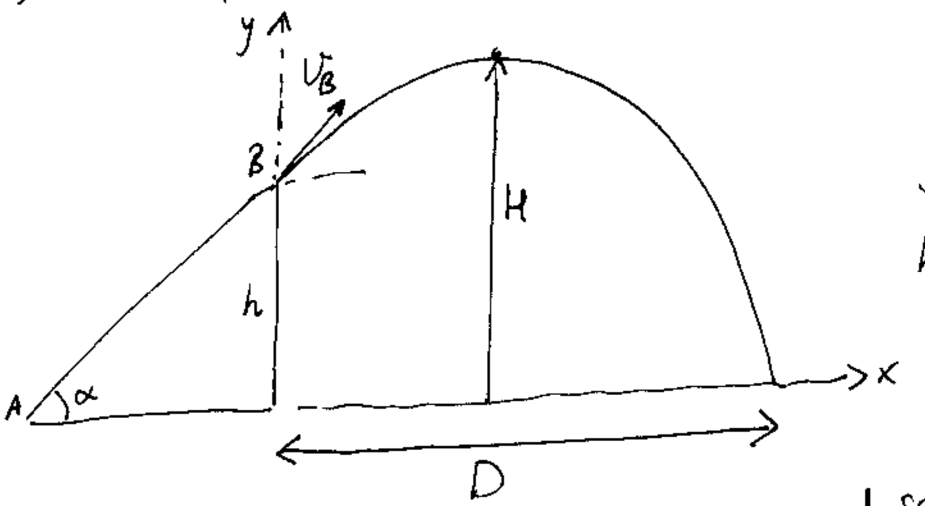
$$\boxed{a = 71{,}6 - 7{,}59 = 64{,}01\ \text{m/s}^2}$$

$$\left.\begin{aligned} v_B &= a \cdot t \\ L &= \frac{1}{2} a t^2 \Rightarrow t = \sqrt{\frac{2L}{a}} \end{aligned}\right\} v_B = a \cdot \sqrt{\frac{2L}{a}} = \sqrt{2aL} = 19{,}59\ \text{m/s}$$

a) $v_{Bx} = \sqrt{2aL}\cos\alpha = 16{,}97\ \text{m/s}$

$v_{By} = \sqrt{2aL}\,\text{sen}\,\alpha = 9{,}799\ \text{m/s}$

b) La trayectoria es una parabola. Calculo de H y D



$x = v_{Bx} \cdot t$

$y = h + v_{By} t - \frac{1}{2} g t^2$

$h = L\,\text{sen}\,\alpha$

La ecuación de la parabola es $y = L\,\text{sen}\,\alpha + \frac{v_{By}}{v_{Bx}} x - \frac{1}{2} g \frac{x^2}{v_{Bx}^2}$

que en números es $y = 1{,}5 + 0{,}58x - 0{,}0174x^2$

el vertice $\underline{H = 6{,}33\ \text{m}}$ y $\underline{D = 35{,}75\ \text{m}}$

<u>NOTA</u>: Si $F(t)=10\cdot t$ entonces

$$a = \frac{10\cdot t}{m}(\cos\alpha - \mu \operatorname{sen}\alpha) - g(\operatorname{sen}\alpha + \mu\cos\alpha)$$

$$a = A\cdot t + B \qquad \text{con} \quad A = \frac{10}{m}(\cos\alpha - \mu \operatorname{sen}\alpha) = 7{,}16\ m/s^3$$

$$B = -g(\operatorname{sen}\alpha + \mu\cos\alpha) = -7{,}6\ m/s^2$$

vemos que la aceleración depende linealmente de t

$$v(t) = \int_0^t a(t)dt = \int_0^t (A\cdot t + B)dt = A\frac{t^2}{2} + B\cdot t$$

$$e(t) = \int_0^t v(t)dt = \frac{At^3}{6} + \frac{Bt^2}{2}$$

a) velocidad en B: $e(t) \equiv L \equiv 3m \rightarrow$ calculamos t
hay que resolver

$$\frac{At^3}{6} + \frac{Bt^2}{2} - L = 0 \quad \text{o bien:} \quad 1{,}193\,t^3 - 3{,}8\,t^2 - 3 = 0$$

La única solución real es $\boxed{t = 3{,}4\ s}$

por tanto $v_B = v(t=3{,}4) = 15{,}6\ m/s$

$$\begin{cases} v_{Bx} = v_B\cos\alpha = 13{,}51\ m/s \\ v_{By} = v_B \operatorname{sen}\alpha = 7{,}8\ m/s \end{cases}$$

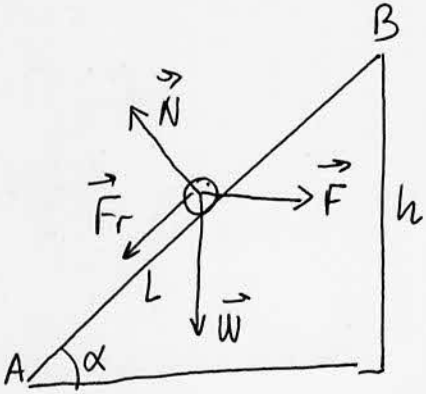
b) Ahora la trayectoria es

$$y = 1{,}5 + 0{,}58\,x - 0{,}0274\,x^2$$

y por tanto $H = 4{,}5693\ m$

$D = 23{,}49\ m$

SOLUCION POR ENERGIAS



$$E(A) + W^{NC}_{A\to B} + W^{F}_{A\to B} = E(B)$$

(1) TRABAJO DE LA FUERZA DE ROZAMIENTO

(2) TRABAJO DE $\vec{F}$

PARTIMOS DEL REPOSO EN A (SALVO QUE SE DIGA LO CONTRARIO)

$$E(A) = 0$$

$$E(B) = \frac{1}{2} m v_B^2 + mgh = \frac{1}{2} m v_B^2 + mgL \,\text{sen}\,\alpha$$

$$(1) \to W^{NC}_{A\to B} = -\mu \cdot N L = -\mu L (F \,\text{sen}\,\alpha + mg\cos\alpha)$$

$$N = F \,\text{sen}\,\alpha + mg\cos\alpha$$

$$(2) \to W^{F}_{A\to B} = F\cos\alpha \cdot L$$

$$0 - \mu L (F \,\text{sen}\,\alpha + mg\cos\alpha) + F\cos\alpha \cdot L = \frac{1}{2} m v_B^2 + mgL \,\text{sen}\,\alpha$$

DE DONDE SE OBTIENE DIRECTAMENTE v_B

$$v_B = \sqrt{\frac{2}{m} F \cdot L (\cos\alpha - \mu \,\text{sen}\,\alpha) - 2Lg(\text{sen}\,\alpha + \mu\cos\alpha)} = \underline{\underline{19{,}59\ m/s}}$$