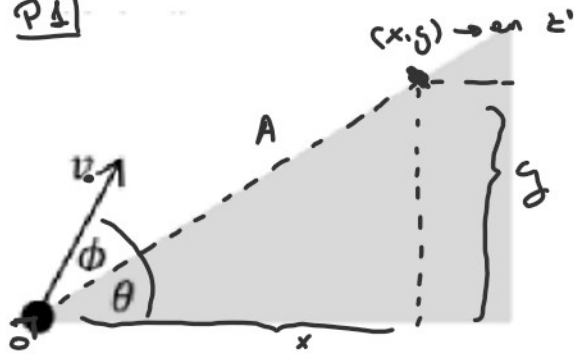


P1

Las ecuaciones de mov son:

$$x(t) = V_{0x}t \quad \text{donde } V_{0x} = V_0 \cos(\phi + \theta)$$

$$\Rightarrow x(t) = V_0 \cos(\theta + \phi) t \quad \text{eq 1}$$

$$y(t) = V_{0y}t - \frac{g t^2}{2} \quad \text{donde } V_{0y} = V_0 \sin(\phi + \theta)$$

$$\Rightarrow y(t) = V_0 \sin(\theta + \phi) t - \frac{g t^2}{2} \quad \text{eq 2}$$

Por otro lado, Tenemos: $t_{\phi\theta} = \frac{y}{x} \rightarrow y = t_{\phi\theta} \cdot x \quad \text{eq 3}$

$\cos \theta = \frac{x}{A}$ o bien en $\theta = \frac{y}{A}$, donde (x', y') en t' (cuando cae sobre la rampa).

De la eq 1 $\rightarrow t' = \frac{x}{V_0 \cos(\theta + \phi)}$, reemplazo en eq 2.

$$\Rightarrow y = \frac{V_0 \sin(\theta + \phi) x}{V_0 \cos(\theta + \phi)} - \frac{g x^2}{2 V_0^2 \cos^2(\theta + \phi)} \quad \text{reemplazo en eq 3}$$

$$\Rightarrow x t_{\phi\theta} = x t_{\phi}(\theta + \phi) - \frac{g x^2}{2 V_0^2 \cos^2(\theta + \phi)} \quad / \cdot \frac{1}{x}$$

$$\Rightarrow t_{\phi\theta} - t_{\phi}(\theta + \phi) = - \frac{g x}{2 V_0^2 \cos^2(\theta + \phi)}$$

$$\Rightarrow \frac{2 V_0^2 \cos^2(\theta + \phi)}{g} (t_{\phi}(\theta + \phi) - t_{\phi}(\theta)) = x = A \cos \theta \quad \text{Triángulo}$$

$$\Rightarrow \frac{2 V_0^2 \cos^2(\theta + \phi)}{g \cos \theta} (t_{\phi}(\theta + \phi) - t_{\phi} \theta) = A //$$

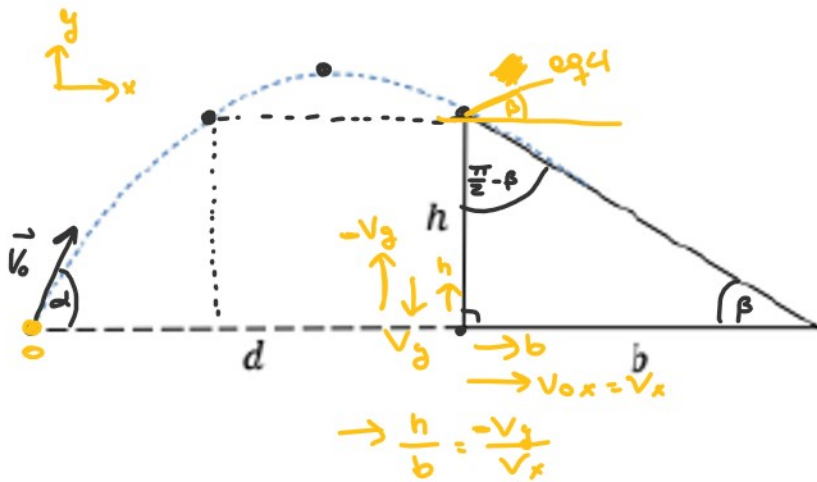
Parte b: Tangente $A(\theta) \rightarrow \frac{dA}{d\theta}(\theta)$ la pendiente de $A(\theta)$

$\rightarrow$ Luego $\frac{dA}{d\theta} = 0$ para tener los

candidatos a máximo/mínimo.

— 0 —

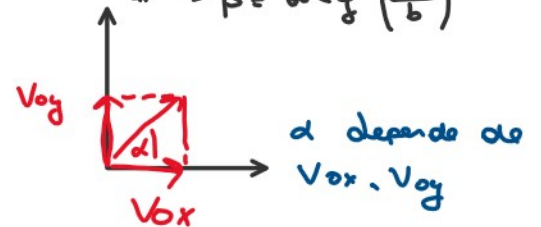
P21



$$\vec{V}_0 = (V_{0x}, V_{0y})$$

$$\tan \alpha = \frac{V_{0y}}{V_{0x}} \rightarrow \alpha = \arctan\left(\frac{V_{0y}}{V_{0x}}\right)$$

$$\# \rightarrow \beta = \arctan\left(\frac{h}{b}\right)$$



$$x(t) = V_{0x}t \rightarrow d = V_{0x}t' \rightarrow t' = \frac{d}{V_{0x}} \quad \text{eq 1}$$

$$y(t) = V_{0y}t - \frac{gt^2}{2} \rightarrow h = V_{0y}t' - \frac{gt'^2}{2} \quad \text{eq 2}$$

$$V_y(t) = V_{0y} - gt \quad \text{eq 3}$$

Luego por trigonometría, se tiene que $\frac{h}{b} = \frac{V_y}{V_x} (-1)$ ¿Por qué? eq 4
 (-1) , puesto que V_y en t' apunta hacia abajo y queremos solo cosas positivas. Z > N $\tan \beta$, me da la inclinación.

Notar que $V_{0x} = V_x(t) \forall t \in \mathbb{R}^+ \Rightarrow -\frac{h}{b} = \frac{V_{0y} - gt'}{V_{0x}} = \tan \beta \quad \text{eq 5}$

(Acabo de imponer que la velocidad en el instante t' tome la inclinación de la rampa).

$$\text{De eq 5} \rightarrow -\frac{V_{0x}h}{b} = V_{0y} - gt' \Rightarrow V_{0y} = gt' - \frac{V_{0x}h}{b}$$

$$\Rightarrow V_{0y} = \frac{gd}{V_{0x}} - \frac{V_{0x}h}{b} \quad \text{eq 6}$$

$$\text{De eq 1 y eq 2} \rightarrow h = \frac{V_{0y}d}{V_{0x}} - \frac{gd^2}{2V_{0x}^2} \Rightarrow \frac{hV_{0x}}{d} = V_{0y} - \frac{gd}{2V_{0x}}$$

$$\Rightarrow V_{0y} = \frac{V_{0x}h}{d} + \frac{gd}{2V_{0x}} \quad \text{eq 7}$$

$$\text{Luego eq 6 = eq 7 (V}_{0y}) \rightarrow \frac{gd}{V_{0x}} - \frac{V_{0x}h}{b} = \frac{V_{0x}h}{d} + \frac{gd}{2V_{0x}}$$

$$\Rightarrow \frac{gd}{V_{0x}} \left(1 - \frac{1}{2}\right) = V_{0x} \left(\frac{h}{d} + \frac{h}{b}\right)$$

$$\Rightarrow + \sqrt{\frac{g d}{2(n/s + n/b)}} = V_{ox}$$

Se concluye " ○

A diagram illustrating projectile motion. A person is shown at a height H on the left, launching an object with an initial velocity u . The object follows a parabolic path (dotted line) and lands on a yellow triangular hill. The hill has a base of $D + d$ and a peak height of a . The landing point is at a horizontal distance D from the launch point and at a height $a/2$ on the hill. The vertical distance from the launch point to the landing point is H . The vertical distance from the base of the hill to the landing point is $a/2$. The horizontal distance from the launch point to the base of the hill is D . The horizontal distance from the base of the hill to the landing point is d . The total horizontal distance is $D + d$. A small inset shows a person standing on the hill.

P4

A spacetime diagram illustrating a worldline. The vertical axis represents time t and the horizontal axis represents space x . The worldline starts at a point labeled $t=0$. It curves downwards and to the right, passing through a point labeled $t=2$. From this point, a dashed line segment extends further downwards and to the right, ending at a point labeled t^* . A bracket next to this segment is labeled $3m$. An arrow points from the top right towards the worldline, labeled $t=2$.