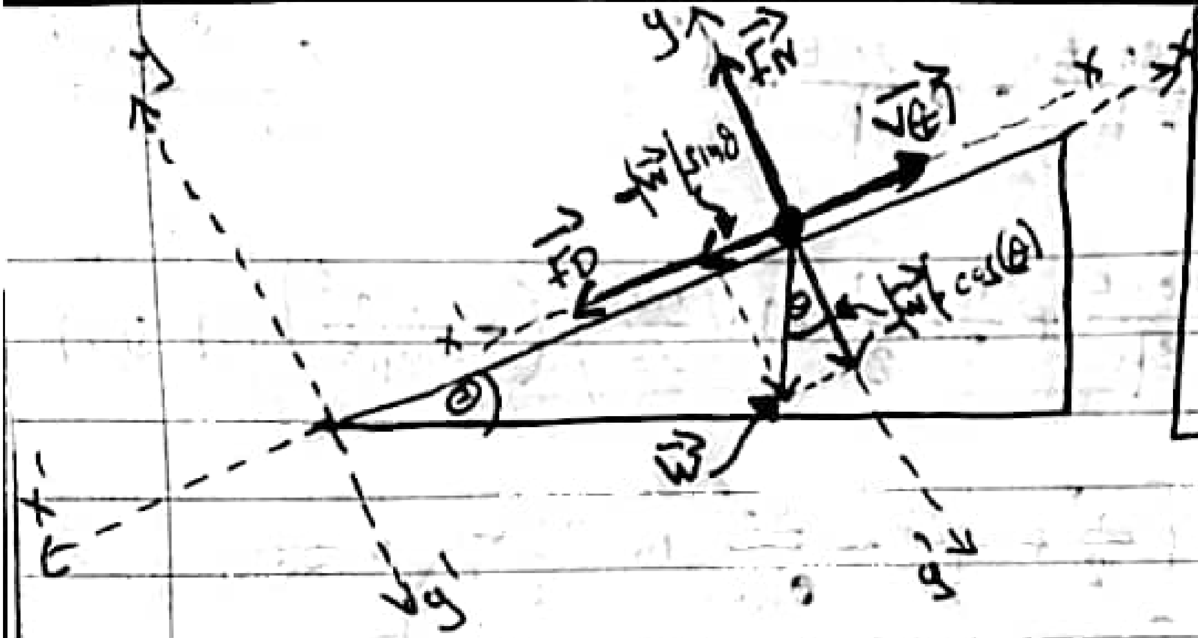


## Data

$m \in \mathbb{R}$

$\theta \in \mathbb{R}$

$v(0) = v_0$

$\vec{F_D} = -B|\vec{v}|$

## Solation

$$\sum \vec{F} = m \cdot \frac{\partial v(t)}{\partial t} \Leftrightarrow -B \cdot v(t) - m \cdot g \cdot \sin\theta = m \cdot \frac{\partial v(t)}{\partial t}$$

$$= m \cdot \frac{\partial v(t)}{\partial x} \cdot \frac{\partial x}{\partial t} = m \cdot \frac{\partial v(t)}{\partial x} \cdot v(t)$$

$$\Leftrightarrow m \cdot \partial v(t) \cdot v(t) = \left[-mg \cdot \sin\theta - B \cdot v(t)\right] \partial x$$

$$\Leftrightarrow \partial x = \frac{m \cdot v(t)}{-mg\sin\theta - B v(t)} \partial v(t)$$

$$\Leftrightarrow \int_{x(0)}^{x(t)} \partial x = -m \int_0^t \frac{v(t)}{B v(t) + mg\sin\theta} \partial v(t)$$

$$\Leftrightarrow \boxed{x(t) - x(0) = -m \int_0^t \frac{v(t)}{B\,v(t) + m \cdot g \cdot \sin\theta}\, \partial v(t)} \quad (1)$$

$$\begin{array}{l|l} v(t) & B\,v(t) + m \cdot g \cdot \sin\theta \\ \hline -\left(v(t) + \frac{m \cdot g \cdot \sin\theta}{B}\right) & \frac{1}{B} \\ \hline -\frac{m \cdot g \cdot \sin\theta}{B} & \end{array}$$

$$x(t) - x(0) = -m \int_0^t \frac{1}{B} - \frac{m \cdot g \cdot \sin\theta}{B^2 \cdot v(t) + B \cdot m \cdot g \cdot \sin\theta}\, \partial v(t)$$

$$= -m \left[ \int_0^t \frac{1}{B}\, \partial v(t) - \frac{m \cdot g \cdot \sin\theta}{B^2} \int_0^t \frac{B^2\, \partial v(t)}{B^2 \cdot v(t) + B \cdot m \cdot g \cdot \sin\theta} \right]$$

Let $u = B^2 \cdot v(t) + B \cdot m \cdot g \cdot \sin\theta$, $u(0) = B \cdot m \cdot g \cdot \sin\theta$

$\partial u = B^2\, \partial v(t)$

$$= -m \left[ \frac{1}{B} \left[ v(t) \right]_0^t - \frac{m \cdot g \cdot \sin\theta}{B^2} \int_{B \cdot m \cdot g \cdot \sin\theta}^{u(t)} \frac{\partial u(t)}{u(t)} \right]$$

$$= -m \left[ \frac{1}{B} \cdot t - \frac{m \cdot g \cdot \sin\theta}{B^2} \left[ \ln\left(B^2 \cdot v(t) + B \cdot m \cdot g \cdot \sin\theta\right) - \ln\left(B \cdot m \cdot g \cdot \sin\theta\right) \right] \right]$$

$$= -m \left[ \frac{1}{B} \cdot t - \frac{m \cdot g \cdot \sin\theta}{B^2} \cdot \ln \frac{B^2 \cdot v(t) + B \cdot m \cdot g \cdot \sin\theta}{B \cdot m \cdot g \cdot \sin\theta} \right]$$

$$x(t) = -m\left[\frac{t}{B} - \frac{m \cdot g \cdot \sin\theta}{B^2} \cdot \ln\left(\frac{B\,v(t) + m \cdot g \cdot \sin\theta}{m \cdot g \cdot \sin\theta}\right)\right] + x(0)$$

$$= -m\left[\frac{Bt - m \cdot g \cdot \sin\theta}{B^2} \cdot \ln\left(\frac{B \cdot v(t) + m \cdot g \cdot \sin\theta}{m \cdot g \cdot \sin\theta}\right)\right] + x(0)$$

$$\boxed{x(t) = -\frac{m \cdot B \cdot t - m^2 \cdot g \cdot \sin\theta}{B^2} \cdot \ln \frac{B\,v(t) + m \cdot g \cdot \sin\theta}{m \cdot g \cdot \sin\theta} + x(0)}$$

(2)

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