n (pivot point)

0.4

original coordinate

Model.

θ

R

X

Calculation.

$$R = \sqrt{0.3^2 + 0.4^2} = 0.5$$

$$\theta \text{ original position} = \arcsin \frac{3}{5}$$

$$\simeq 36°$$

Let $\theta_{max} = \frac{\pi}{4}$, (time unit) $dt = 0.1$

angular acceleration $\theta'' = -\frac{g}{R} \sin\theta$. (g=9.81)

By accumulating angular velocity and angle θ

$$V_{after} = \theta t + V_{before}, \quad \theta_{after} = V \times dt + \theta_{before}.$$

horizontal distance

$$X_{dis} = R \cdot \sin\theta$$

$$X_{lub} = X_{lub \ at \ original \ position} + X_{dis}$$

Since direction of pendulum swing is considered as positive or negative horizontal distance. the ultimate coordinate of chalk bag is staright-forward as original position accumulated by the distance