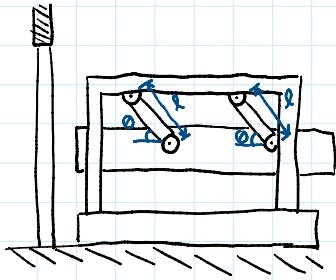


Beginner Impact

Inspiration: 19-41 Hibbeler, 20-R-KIN-DK-13



Wording is a bit unintuitive, yes? How should I reword this?

The siege on the castle of Santa Ono continues. The battering ram has been moved to the front and prepares to strike the door. If the 200 kg log is released from rest at an angle of $\theta = 30^\circ$, determine the smallest angle the log will rebound to. The coefficient of restitution is $e = 0.4$. Assume the log strikes the door when the linkages are perpendicular to the ground. The linkages have length $l = 1.2 \text{ m}$.

$$T_1 + V_1 = T_2 + V_2 \quad \text{Set datum as top pin}$$

$$0 - (200)(9.81)(1.2 \sin \theta) = \frac{1}{2} (200)(v_2)^2 - (200)(9.81)(1.2)$$

$$1177.2 = 100 v_2^2 \quad v_2 = 3.431034429 \text{ m/s}$$

$$e = \frac{v_3 - v_{\text{door}2}}{v_{\text{door}1} - v_2} = \frac{v_3 - 0}{0 - (-3.431)} \quad 0.4 = \frac{v_3}{3.431} \quad v_3 = 1.3724 \text{ m/s}$$

$$T_3 + V_3 = T_4 + V_4$$

$$\frac{1}{2} (200)(1.3724)^2 - 200(9.81)(1.2) = 0 - 200(9.81)(1.2 \sin \theta)$$

$$\frac{23}{25} = \sin \theta$$

$$\theta = 66.926^\circ$$

State 1



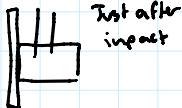
State 2



Just before impact



State 3



Just after impact

State 4

