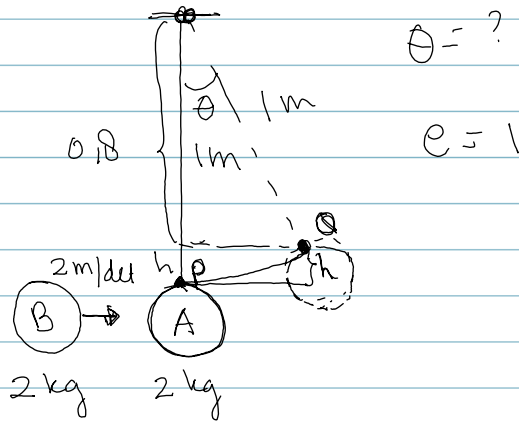


1)

Soal Variasi tumbukan

1)



Proses tumbukan

$$\begin{array}{c} 2 \text{ m/det} \\ \text{B} \rightarrow \text{A} \\ 2 \text{ kg} \quad 2 \text{ kg} \end{array} \quad P = 4 \text{ s.d}$$

$$\begin{array}{c} V_B' \quad V_A' \\ \text{B} \rightarrow \text{A} \rightarrow \end{array} \quad P' = 2V_B' + 2V_A'$$

$$4 = 2V_B' + 2V_A' \quad \text{--- U)}$$

$$1 = -\frac{V_A' - V_B'}{V_A - V_B}$$

$$1 \cdot 2 = V_A' - V_B'$$

$$2 = V_A' - V_B'$$

$$2 = V_A' + V_B'$$

$$\underline{V_A' = 2 \text{ m/det} \quad V_B' = 0}$$

Proses P Q

$$\frac{1}{2} m V_A'^2 = m g h$$

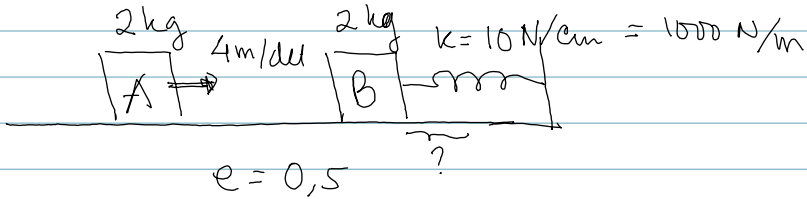
$$\frac{1}{2} \cdot 2^2 = 10 \cdot h$$

$$h = 0,2 \text{ m}$$

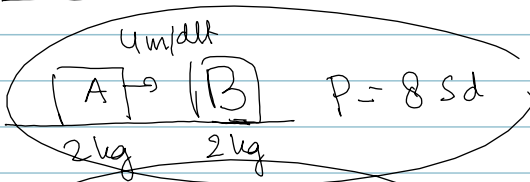
$$\boxed{\cos \theta = 0,8}$$

$$\theta = \dots$$

2.)



Proses tumbukan

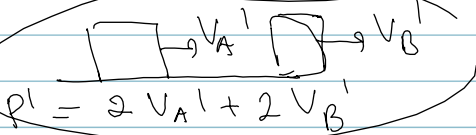


$$\frac{1}{2} m_B v_B^2 = \frac{1}{2} k x^2$$

$$2 \cdot 3^2 = 1000 \cdot x^2$$

$$x^2 = \frac{18}{1000}$$

$$x = \sqrt{\frac{18}{1000}} \text{ m}$$



$$8 = 2v_A' + 2v_B'$$
$$4 = v_A' + v_B' \text{ --- (1)}$$

$$e = -\frac{(v_A' - v_B')}{4}$$

$$0,5 = -\frac{(v_A' - v_B')}{4}$$

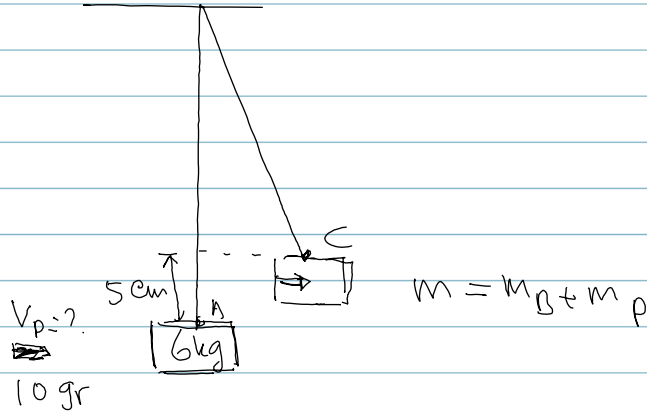
$$2 = v_B' - v_A' \text{ --- (2)}$$

$$4 = v_B' + v_A' \text{ --- (1) +}$$

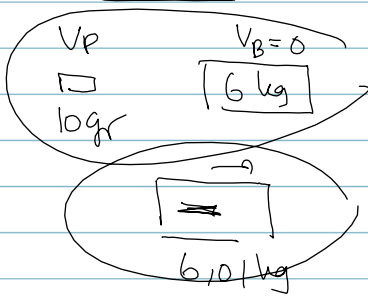
$$6 = 2v_B'$$

$$v_B' = \underline{\underline{3 \text{ m/det}}}$$

3



tumbukan



$$p = 0,01 \cdot V_p + 0$$

$$p' = 6,01 \cdot v$$

$$0,01 V_p = 6,01$$

$$V_p = \underline{\underline{601 \text{ m/det}}}$$

naiknya balok

$$\frac{1}{2} m V_B^2 = mgh$$

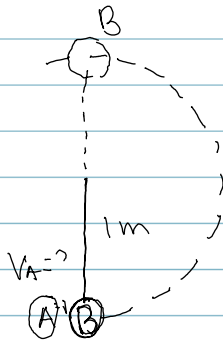
$$\frac{1}{2} V_B^2 = gh$$

$$V_B = \sqrt{2gh}$$

$$= \sqrt{2 \cdot 10 \cdot 0,05}$$

$$= 1 \text{ m/det}$$

(4)



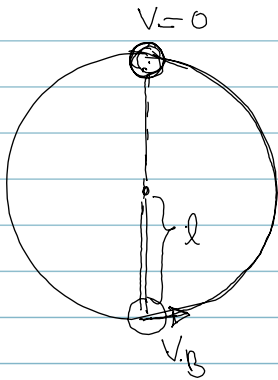
(1) V_A ? agar B di titik puncak

(2) V_A ? agar B membuat lintasan penuh

$$m_A = 2 m_B$$

elastik $e = 1$

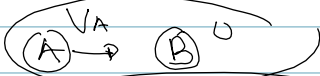
1)



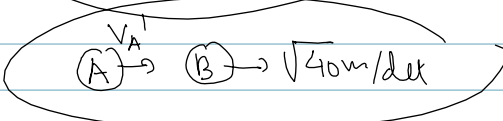
$$\frac{1}{2} m_B V_B^2 = m_B g \cdot 2l$$

$$V_B = \sqrt{4 \cdot g \cdot l} = \sqrt{4 \cdot 10 \cdot 1} = \sqrt{40} \text{ m/det}$$

Proses tumbukan



$$m_A V_A$$



$$m_A V_A' + m_B \sqrt{40}$$

$$2 m_B V_A = 2 m_B V_A' + m_B \sqrt{40}$$

$$2 V_A - 2 V_A' = \sqrt{40}$$

$$V_A - V_A' = \sqrt{10}$$

$$V_A' + V_A = \sqrt{40} +$$

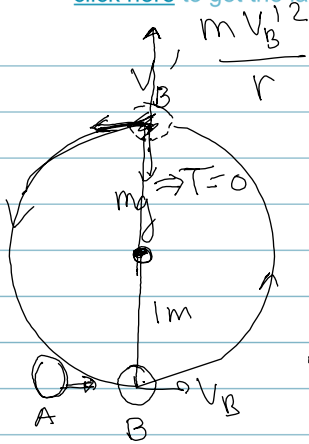
$$2 V_A = 3 \sqrt{10}$$

$$e = 1 = -\frac{V_A' - \sqrt{40}}{V_A - 0}$$

$$-V_A = V_A' - \sqrt{40}$$

$$V_A = \frac{3}{2} \sqrt{10} \text{ m/det}$$

4b



$$\frac{m v_B^2}{r} = m g$$

$$v_B^1 = \sqrt{g \cdot r} = \sqrt{10} \text{ m/det}$$

$$\frac{1}{2} m v_B^2 = m g h + \frac{1}{2} m v_B^1{}^2$$

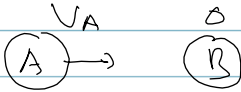
$$v_B^2 = 2 g h + v_B^1{}^2$$

$$= 2 \cdot 10 \cdot 2 + 10$$

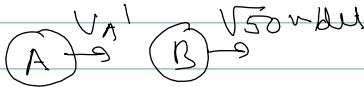
$$v_B^2 = 50 \rightarrow v_B = \underline{\underline{\sqrt{50} \text{ m/det}}}$$

$$m_A = 2 m_B$$

tumbukan A & B :



$$m_A v_A$$



$$m_A v_A' + m_B \sqrt{50}$$

$$m_A v_A = m_A v_A' + m_B \sqrt{50}$$

$$2 m_B v_A = 2 m_B v_A' + m_B \sqrt{50} \quad e=1$$

$$2 v_A = 2 v_A' + \sqrt{50} \rightarrow$$

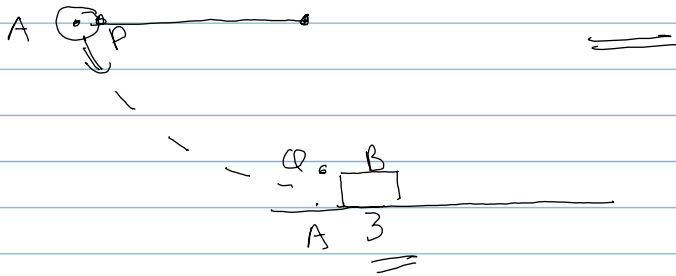
$$v_A' + v_A = \sqrt{40}$$

$$2 v_A - 2 v_A' = \sqrt{50}$$

$$2 v_A + 2 v_A' = 2 \sqrt{40} +$$

$$4 v_A = \sqrt{50} + 2 \sqrt{40}$$

$$v_A = \frac{1}{4} (\sqrt{50} + 2 \sqrt{40}) \text{ m/det}$$



P-Q

$$mgh = \frac{1}{2} m v_A^2$$

$$v_A = \sqrt{2gh}$$
$$= \sqrt{2 \cdot 10 \cdot 0,5}$$
$$= \underline{\underline{\sqrt{10} \text{ m/det}}}$$

$$e = 1$$

$$\frac{v_A' - v_B'}{\sqrt{10}} = 1$$

$$v_A' - v_B' = \sqrt{10}$$

tumbukan

$\sqrt{10} \text{ m/det}$

$P = 1 \cdot \sqrt{10}$

$P' = 1 \cdot v_A' + 3 v_B'$

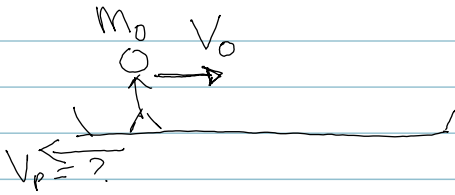
$$\sqrt{10} = v_A' + 3 v_B'$$

$$-\sqrt{10} = v_A' - v_B'$$

$$2\sqrt{10} = 4 v_B'$$

$$v_B' = \underline{\underline{\frac{1}{2} \sqrt{10} \text{ m/det}}}$$

6



$$V_0 \text{ vel thd perahu} = V_{0t} + V_p$$

$m_0(V_0 - V_p) \rightarrow$ Kemampuan memdobrak orang

$\underbrace{m_0(V_0 - V_p)} \rightarrow I_p$ (dobrakan perahu)

$m_p V_p \rightarrow$ kemampuan memdobrak perahu

$\underbrace{m_p V_p} \rightarrow I_0$ (dobrakan orang)

$$m_0(V_0 - V_p) = m_p V_p$$

$$m_0 V_0 = (m_p + m_0) V_p$$

$$\checkmark \boxed{V_p = \frac{m_0 V_0}{m_p + m_0}} \quad \underline{\underline{\text{thd tanah}}}$$

$$P = 0$$

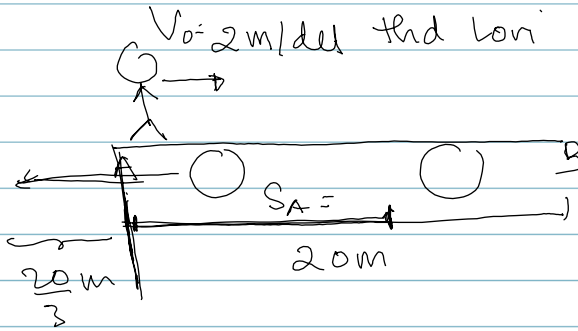
$$P1 = m_0 V_{0t} - m_p V_p$$

$$0 = m_0(V_0 - V_p) - m_p V_p$$

$$V_p = \frac{m_0 V_0}{m_p + m_0} //$$

8

7



a) $t_{AB} = ?$

b) $S_A = ?$

$m_0 = 20 \text{ kg}$
 $m_L = 40 \text{ kg}$

a) $t_{AB} = \frac{20}{2} = 10 \text{ det}$

b) $m_0 V_0 = m_L V_L$

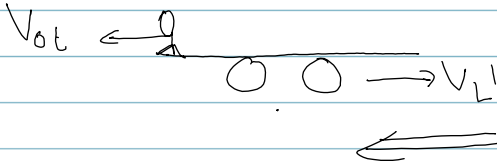
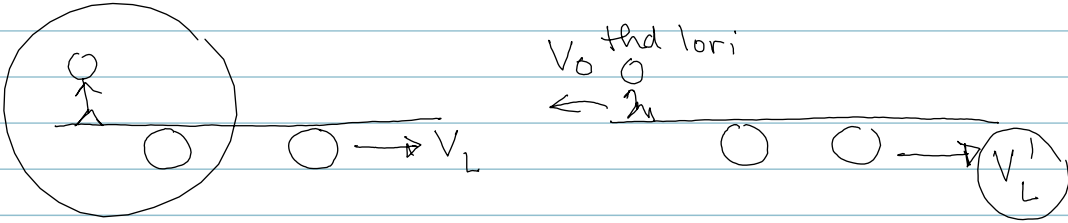
$m_0 (V_0 - V_L) = m_L V_L$

$m_0 V_0 = (m_0 + m_L) V_L$

$V_L = \frac{m_0 V_0}{m_0 + m_L} = \frac{20 \cdot 2}{20 + 40} = \frac{40}{60} = \frac{2}{3} \text{ m/det}$

10 det \rightarrow Lori bergerak $\frac{2}{3} \times 10 = \frac{20}{3} \text{ m}$

$S_A = 20 - \frac{20}{3} = \frac{40}{3} \text{ m}$



$$\begin{aligned}V_{o/L} &= V_{ot} + V'_L \\V_o &= V_{ot} + V'_L \\V_{ot} &= V_o - V'_L\end{aligned}$$

orang : $P = m_o V_L$ (kekanan)
 $P' = m_o V_{ot} = (m_o (V_o - V'_L))$ (ke kiri)

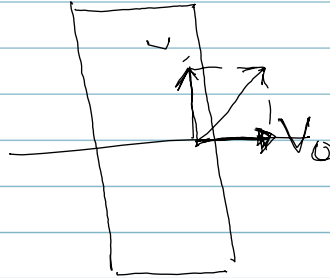
$$I_L = m_o V_L + m_o (V_o - V'_L)$$

Lori : $P = m_L V_L$ $P' = m_L V'_L$

$$I_o = m_L V'_L - m_L V_L$$

$$\begin{aligned}m_o V_L + m_o (V_o - V'_L) &= m_L (V'_L - V_L) \\m_o V_o - m_o (V'_L - V_L) &= m_L (V'_L - V_L) \\m_o V_o &= (m_o + m_L) (V'_L - V_L) \\V'_L - V_L &= \frac{m_o V_o}{m_o + m_L}\end{aligned}$$

$$V'_L = V_L + \frac{m_o V_o}{m_o + m_L}$$



$V_{Lori} = ?$

Orang :

$$\left. \begin{aligned} p &= m_0 v_L \\ p' &= m_0 v_L \end{aligned} \right\} \text{ arah gerak lori}$$

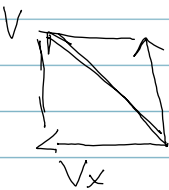
$$\left. \begin{aligned} p_x &= 0 \\ p_x' &= m_0 v_0 \end{aligned} \right\} I_L = p_x' - p_x = m_0 v_0$$

Lori

$$\left. \begin{aligned} p_x &= 0 \\ p_x' &= m_L v_x \end{aligned} \right\} I_0 = p_x' - p_x = m_L v_x$$

$$I_L = I_0$$

$$m_0 v_0 = m_L v_x \rightarrow v_x = \frac{m_0}{m_L} v_0$$



$$V = \sqrt{V_L^2 + V_x^2}$$

$$= \sqrt{V_L^2 + \left(\frac{m_0}{m_L} v_0\right)^2}$$