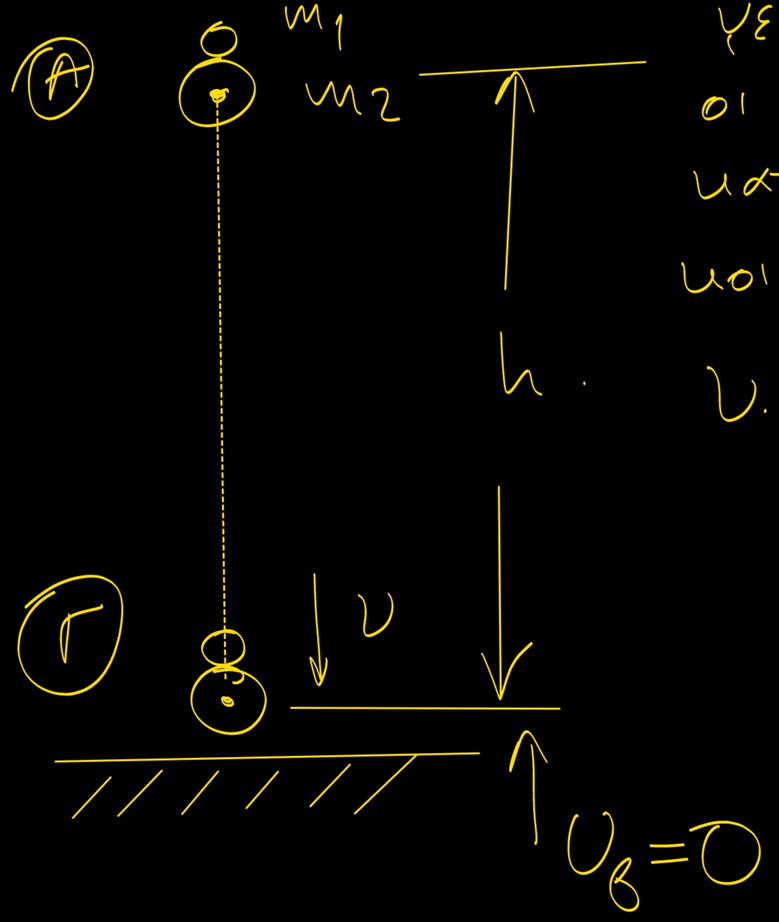
Άσκηση

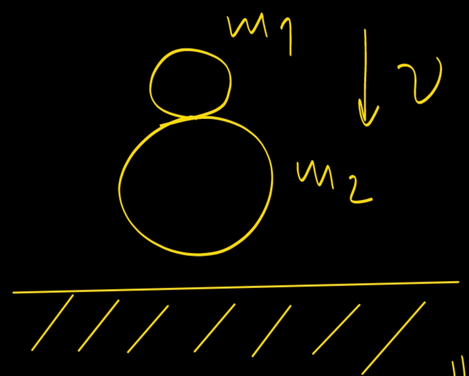


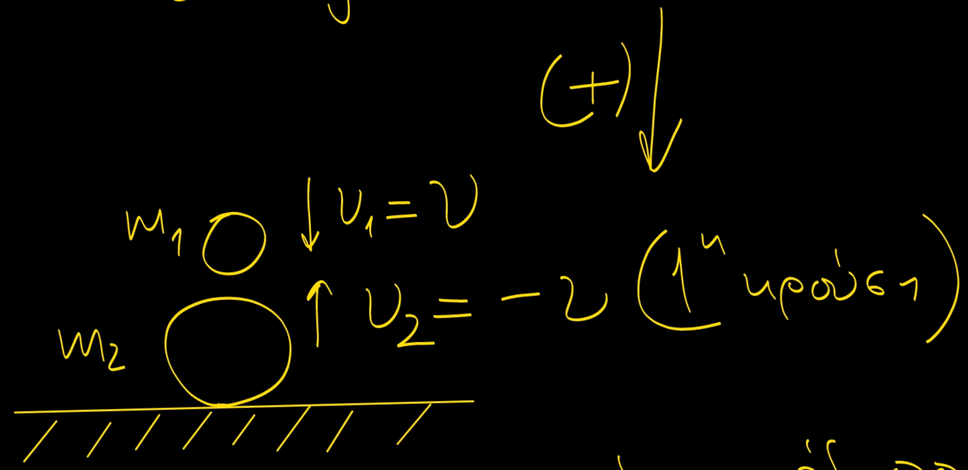
Πριν την κρούση με το έδαφος όλα οι δύο μπάλες κατεβαίνουν με κοινή ταχύτητα v.

$$K_A+U_A=K_\Gamma+U_\Gamma \Rightarrow$$

$$0+m_1gh=\frac{1}{2}m_1v^2+0 \Rightarrow$$

$$v=\sqrt{2gh}.$$





m_2 αναπηδάται ελαστικά στο έδαφος (δίνω πολύ μεγάλη μάζα) και αμέσως μετά την 1η κρούση ανεβαίνει με ταχύτητα $v_2=-v$ ενώ η m_1 ακόμα κατεβαίνει.

$$v_1' = \frac{m_1-m_2}{m_1+m_2}u_1 + \frac{2m_2}{m_1+m_2}u_2 = \frac{m_1-m_2}{m_1+m_2}\cdot v + \frac{2m_2}{m_1+m_2}(-v) \simeq$$

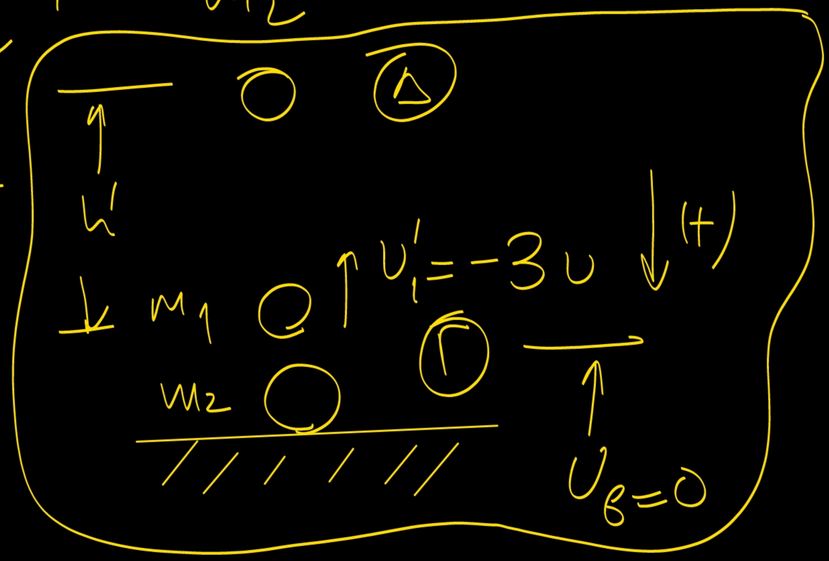
$$\simeq \frac{-m_2}{m_2}\cdot v + \frac{2m_2}{m_2}(-v) \simeq$$

$$\simeq -3v$$

$$v_2' = \frac{2m_1}{m_1+m_2}u_1 + \frac{m_2-m_1}{m_1+m_2}u_2$$

$$v_2' \simeq \frac{2m_1}{m_2}u_1 + \frac{m_2}{m_2}u_2 \Rightarrow$$

$$v_2' \simeq u_2$$



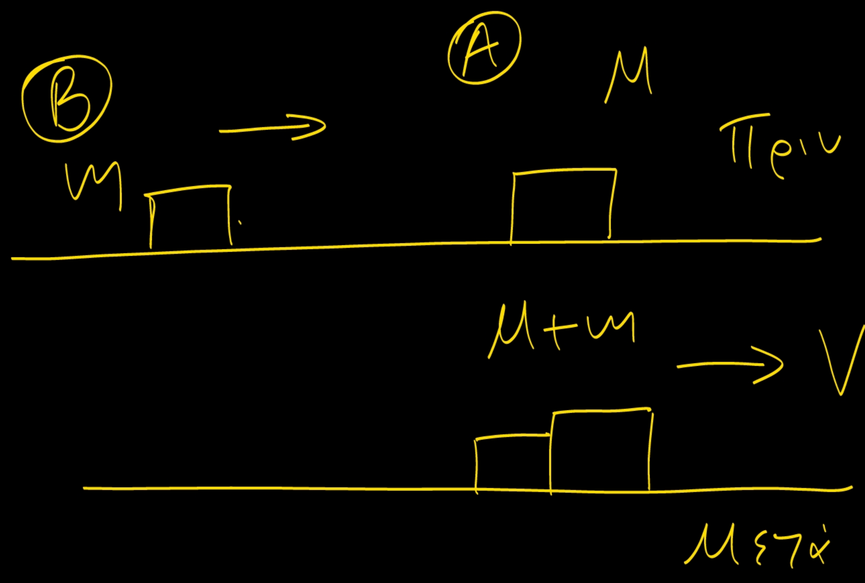
Για την m_1 μετά την κρούση έχουμε:

$$K_\Gamma + U_\Gamma = K_\Delta + U_\Delta \Rightarrow \frac{1}{2}m_1 v_1'^2 + 0 = m_1 g h' + 0 \Rightarrow$$

$$\frac{(-3v)^2}{2} = gh' \Rightarrow \frac{9v^2}{2} = gh' \Rightarrow \frac{9\cdot 2gh}{2} = gh'$$

$$\Rightarrow h' = 9h$$

Εφ. 1.38 | Θεμ. 16.)



$P_{πριν} = P_{μετά} \Rightarrow$

$mU = (M+m)V$

$$Q = \frac{1}{2}mU^2 - \frac{1}{2}(M+m)V^2 =$$

$$= \frac{1}{2}mU^2 - \frac{1}{2}(M+m)\frac{m^2U^2}{(M+m)^2} =$$

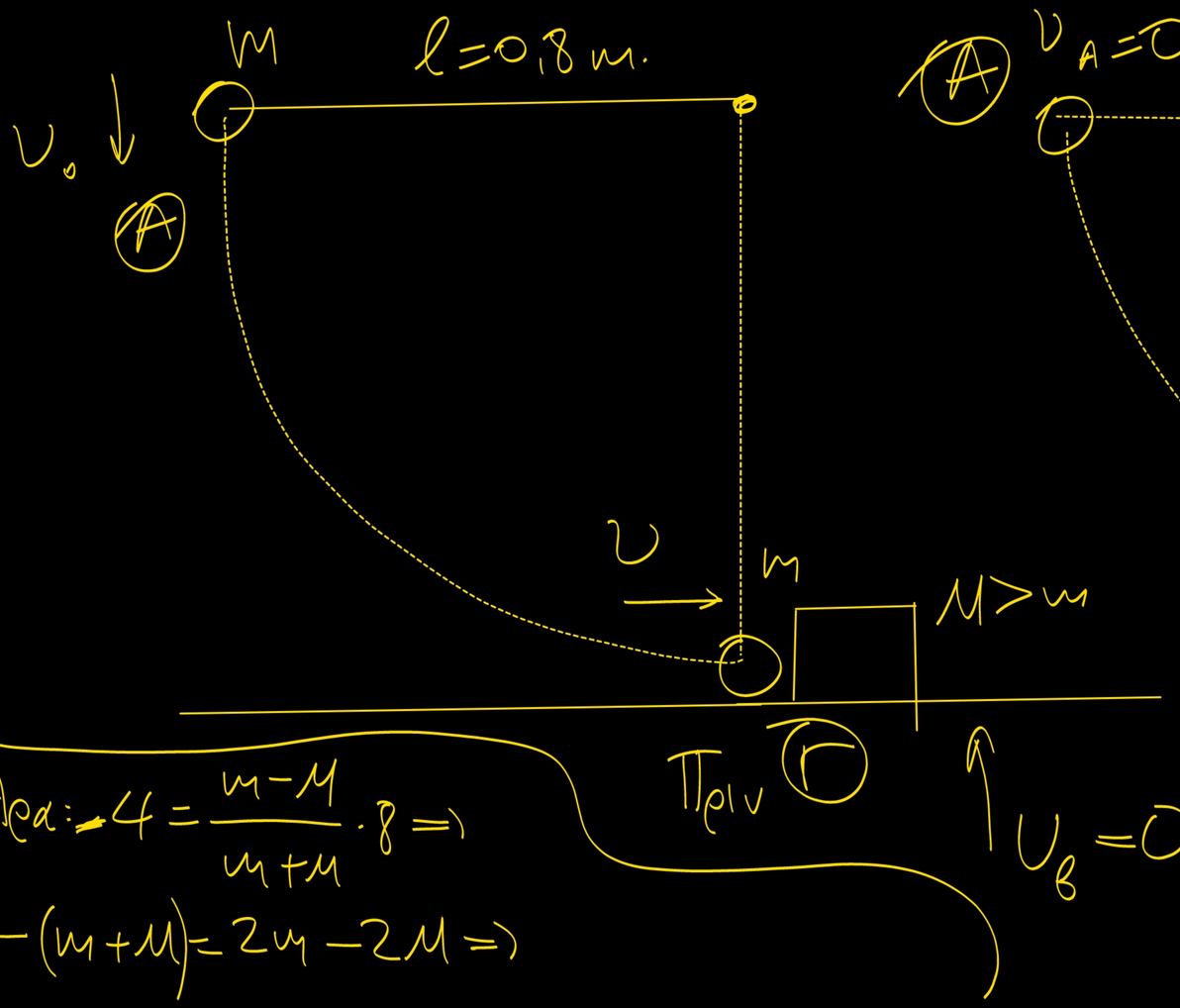
$$= \frac{1}{2}mU^2\left(1 - \frac{m}{M+m}\right) \Rightarrow$$

$$Q = \frac{1}{2}mU^2 \cdot \frac{M}{M+m} \Rightarrow \frac{Q}{K_{αρχ}} = \frac{M}{M+m}$$

$$\frac{Q}{K_{αρχ}} \cdot 100\% = 80\% \Rightarrow Q = 0,8K_{αρχ}$$

Άρα: $\frac{0,8K_{αρχ}}{K_{αρχ}} = \frac{M}{M+m} \Rightarrow 0,8M + 0,8m = M \Rightarrow M = 4m$

Ασκ. 1.56 σελ. 21.)



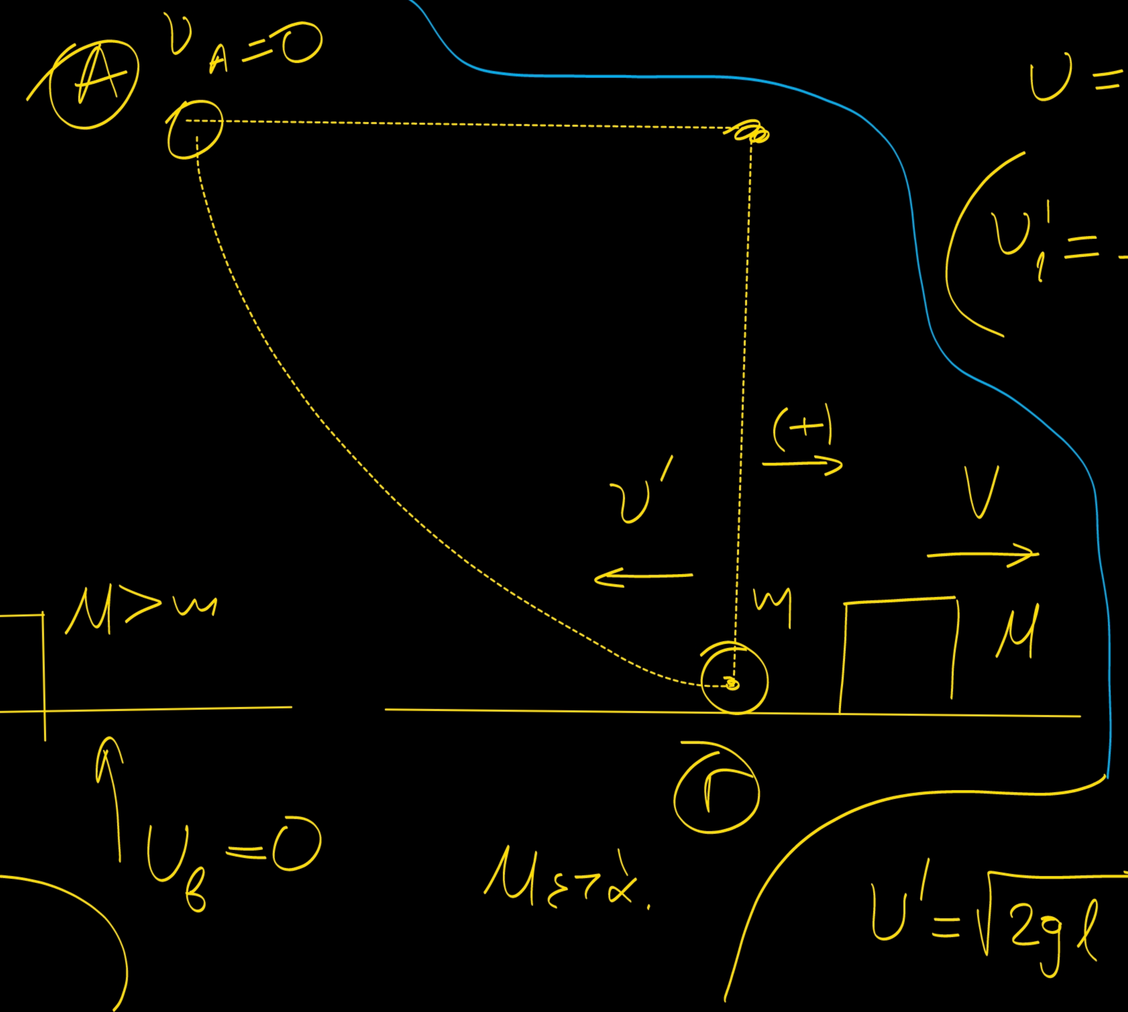
Αρα: $-4=\frac{m-M}{m+M}\cdot 8 \Rightarrow$

$-(m+M)=2m-2M \Rightarrow$

α) $\frac{1}{2}mv_0^2+mgl=\frac{1}{2}mv^2 \Rightarrow v_0^2+2gl=v^2 \Rightarrow$

$16\cdot 3+2\cdot 0{,}8\cdot 10=v^2 \Rightarrow 16\cdot 4=v^2 \Rightarrow$

$v=8$ m/s.



$\left(v_1'=\frac{m_1-m_2}{m_1+m_2}v_1\right)$

$v'=\frac{m-M}{m+M}v$

ΑΔΕ: Γ → Α

$\frac{1}{2}mv'^2=mgl \Rightarrow$

$v'=\sqrt{2gl}=4$ m/s.