

$$v_1 = 7 \text{ m/s} \quad m_1 = 0.4 \text{ kg} \quad m_2 = 0.6 \text{ kg}$$

until compl. anal.  $v = 5.8 \text{ m/s}$

$$k = 150 \text{ N/m}$$

$$v_{21} = ?, \quad A = ?$$

~~$$m_1 \bar{v}_1 + m_2 \bar{v}_2 = (m_1 + m_2) \bar{v}_{21}$$~~

~~$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v_{21}$$~~

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v \quad v_{21} = v_2 - v_1 \quad *$$

$$m_1 \bar{v}_1 + m_2 \bar{v}_2 = (m_1 + m_2) \bar{v} \quad \bar{v}_{21} = \bar{v}_1 - \bar{v}_2$$

$$v_2 = \frac{1}{m_2} \left( (m_1 + m_2) v - m_1 v_1 \right) = 5 \text{ m/s}$$

$$v_{21} = v_2 - v_1 = -2 \text{ m/s}$$

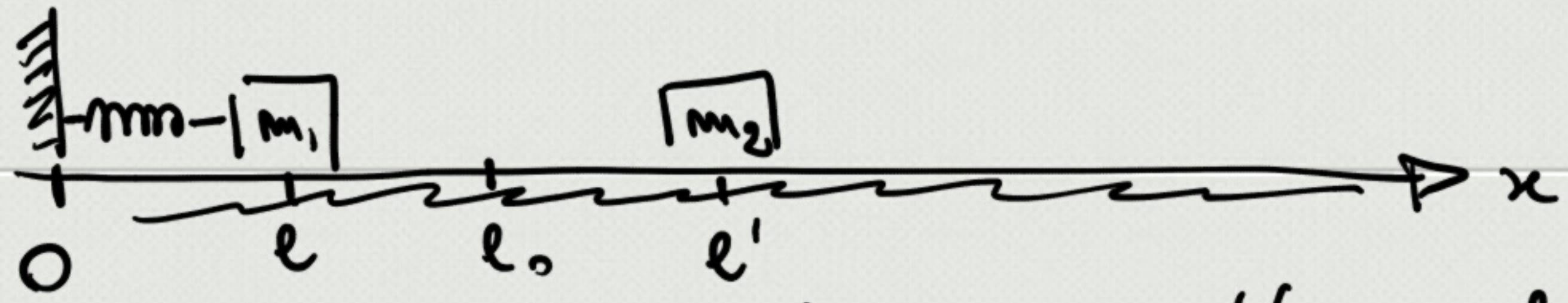
$$\cancel{\frac{1}{2}(m_1 + m_2) \nu^2} = \cancel{\frac{1}{2} k \Delta^2} \quad *$$

$$\cancel{\frac{1}{2} m_1 \nu_1^2 + \cancel{\frac{1}{2} m_2 \nu_2^2}} = \cancel{\frac{1}{2} k \Delta^2}$$

$$* \begin{cases} x(t) = A \sin(\omega t + \phi) & x(0) = 0 \\ \nu(t) = A \omega \cos(\omega t + \phi) & \nu(0) = \nu \end{cases} \quad \omega = \sqrt{\frac{k}{m_1 + m_2}}$$

$$\begin{cases} x(t) = A \cos(\omega t + \phi) & x(0) = 0 \\ \nu(t) = -A \omega \sin(\omega t + \phi) & \nu(0) = \nu \end{cases} \quad \omega = \sqrt{\frac{k}{m_1 + m_2}}$$

$$A = \nu \sqrt{\frac{m_1 + m_2}{k}} = 0.47 \text{ m}$$



$$\mu_1 = \mu_2 = \mu = 0.3 \quad k = 400 \text{ N/m} \quad l_0 = 0.5 \text{ m} \quad |\Delta l| = 0.2 \text{ m}$$

$$m_1 = 2 \text{ kg} \quad v_{01} = 0$$

$$m_2 = 1 \text{ kg} \quad v_{02} = 0 \quad l' - l = 0.3 \text{ m}$$

urto compl. anel.

$$v = ?$$

$$W_{mc} = \Delta E_m$$

$$\Rightarrow -\mu m_1 g (l' - l) = \left( \frac{1}{2} m_1 v_i^2 + \frac{1}{2} k (l' - l_0)^2 \right) - \frac{1}{2} k (l - l_0)^2$$

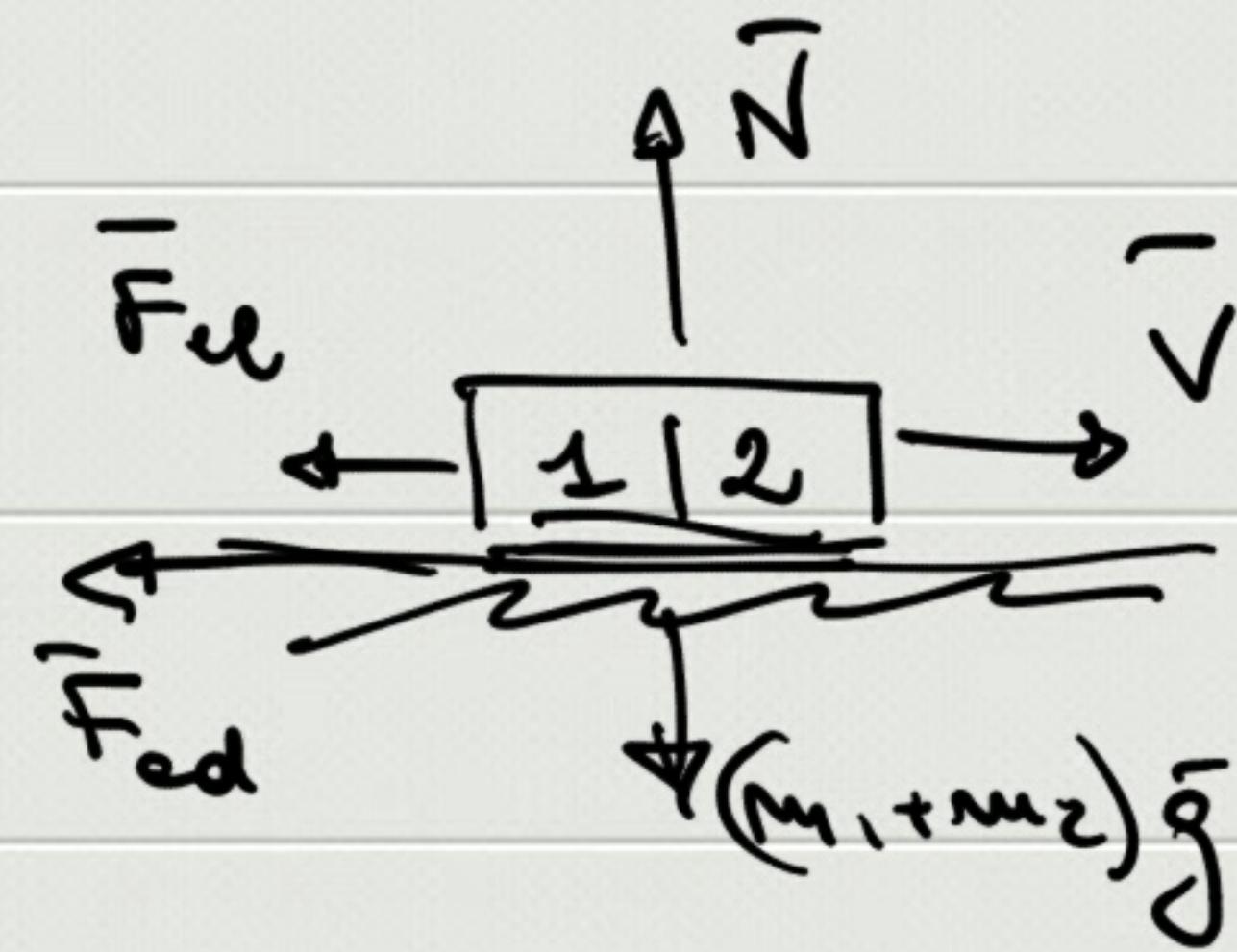
$\uparrow \quad E_{m,i}$

$$v_i = \sqrt{-2\mu g (l' - l) + \frac{k}{m_1} [(l - l_0)^2 - (l' - l_0)^2]} = 2.06 \text{ m/s}$$

$$\bar{P} = \cos t \Rightarrow m_1 v_i = (m_1 + m_2) v$$

$$\Rightarrow v = \frac{m_1}{m_1 + m_2} v_i = 1.37 \text{ m/s}$$

$$a = ?$$



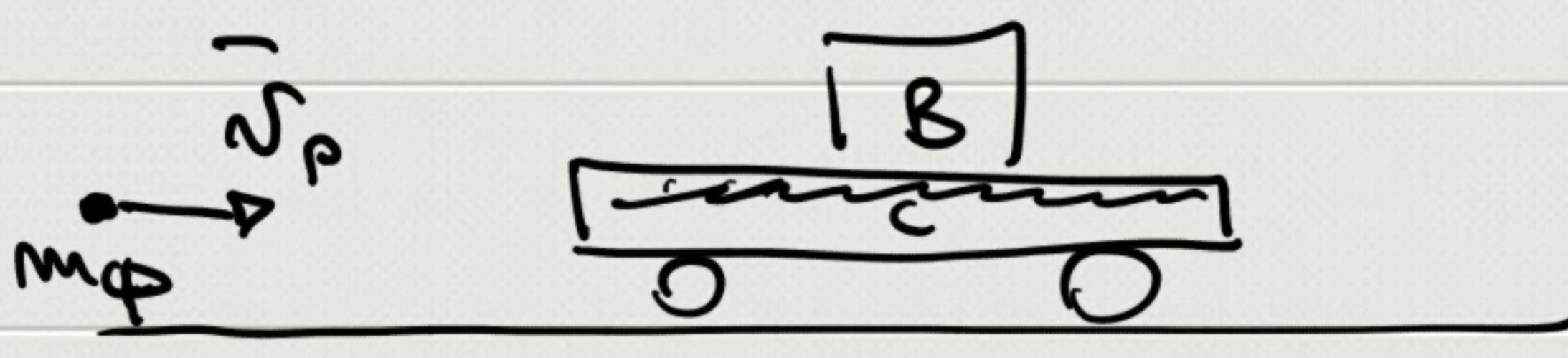
$$-\mu(m_1 + m_2)g - k(l' - l_0) = (m_1 + m_2) \alpha \quad (\text{at const})$$

$$\Rightarrow a = -mg - k \frac{l' - l_0}{m_1 + m_2} = -16.3 \text{ m/s}^2$$


The diagram shows a horizontal line representing a rod. Two circular masses are attached to the rod by a spring. The mass on the left is a solid circle, and the mass on the right is a hollow circle with a vertical axis through its center.

$$\Delta E_{\max} = ? \quad W_{nc} = \Delta E_m$$

$$= 0.148 \text{ m}$$



$$m_c = 25 \text{ kg}$$

$$m_B = 10 \text{ kg}$$

$$N_{oc} = N_{og} = 0 \quad N_p = 48 \text{ m/s} \quad m_p = 5 \text{ kg}$$

vito comp. anel.

$$N_c^1 (\mu=0) = ?$$

$$N_c^1 (\mu=0.4) = ?$$

$$m_p N_p = (m_p + m_c) N_c^1 \Rightarrow N_c^1 = \frac{m_p}{m_p + m_c} N_p = 8 \text{ m/s}$$

$$m_p N_p = (m_p + m_c) N_c^1 \quad *$$

$$m_p N_p = (m_p + m_c + m_B) N_c^1$$

$$m_p N_p = (m_p + m_c) N_c^1 + m_B N_B^1 \quad N_B^1 = -N_c^1$$

$$m_p N_p = (m_p + m_c) N_c^1 - m_B \mu d g$$

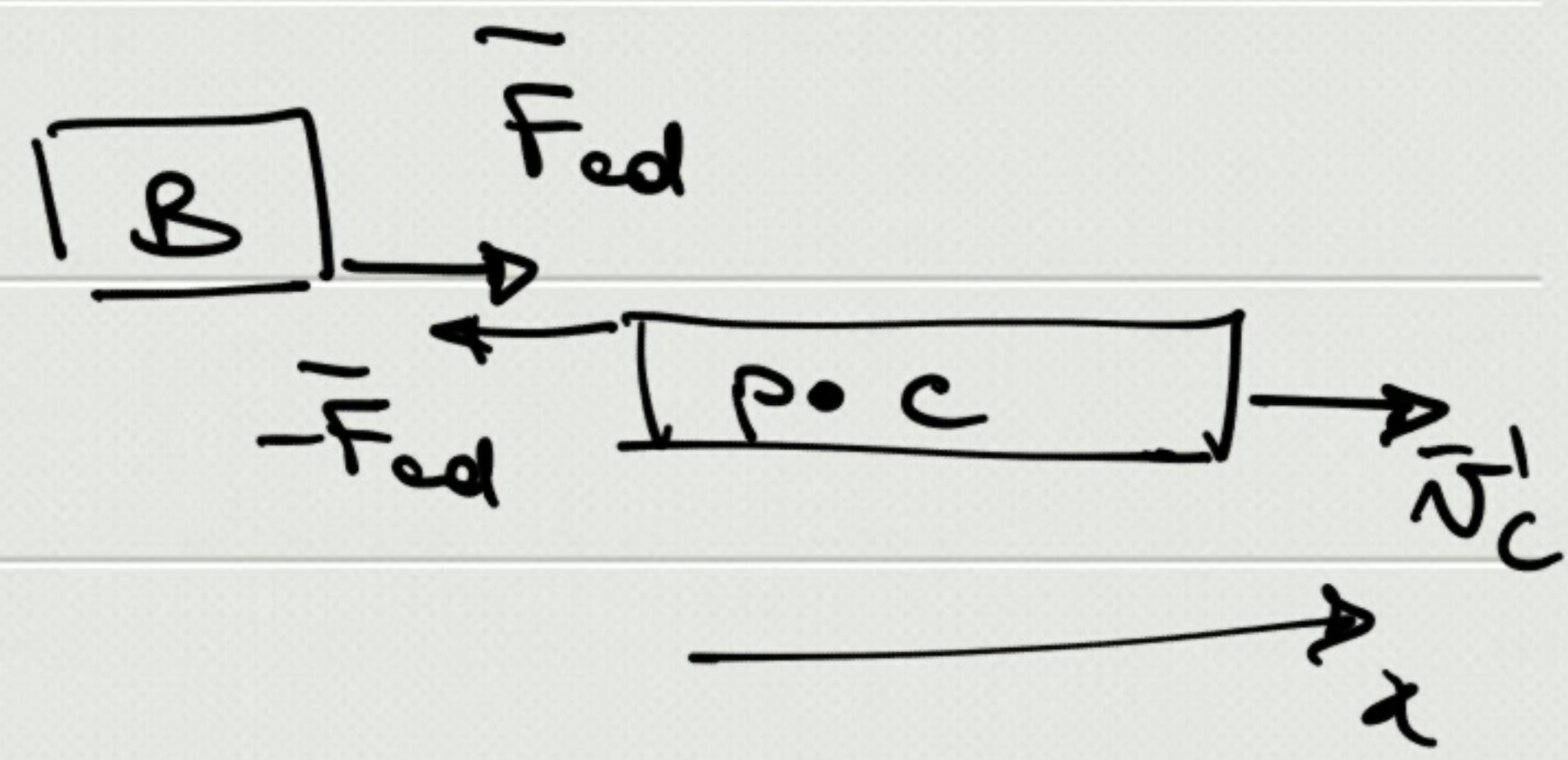
$$a'_c = ?$$

$$a'_c = 0$$

$$a'_c = -\mu g$$

$$(m_c + m_p) a'_c = -\mu m_B g \quad *$$

$$(m_c + m_p + m_B) a'_c = -\mu m_B g$$



$$a'_c = -\mu g \frac{m_B}{m_c + m_p} = -1.3 \text{ m/s}^2$$

$$v''_c (v_{Bc} = 0) = ?$$

~~$$-\mu m_B g d = 0 - \frac{1}{2} (m_p + m_c + m_B) v''_c^2 \quad 0 = v''_c^2 - 2 a'_c d$$~~

$$m_p v_p = (m_p + m_c + m_B) v''_c \quad *$$

$$(m_p + m_c) v'_c = (m_p + m_c + m_B) v''_c \quad *$$

~~$$v''_c = 0$$~~

$$v''_c = \frac{m_p}{m_p + m_c + m_B} v_p = 6 \text{ m/s}$$

$$W_{\text{eff}} = ?$$

$$\Delta E_{\text{mm}}$$

$$W_{\text{eff}} = \frac{1}{2} (m_c + m_p + m_B) v_c'^2 - \frac{1}{2} (m_c + m_p) v_c'^2$$

$$\left\{ \begin{array}{l} W_{\text{eff}} = \mu m_B g d' \\ 0 = v_c'^2 + 2 a' d' \\ a' = a - a_c = \mu g + \mu g \frac{m_B}{m_c + m_p} \end{array} \right.$$

$$\Rightarrow W_{\text{eff}} = -24 \text{ J}$$