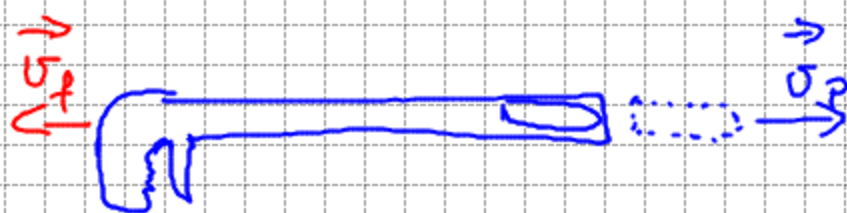


# QUANTITÀ DI MOTO

$$\vec{p} = m \vec{v}$$



- conservazione della quantità di moto



$$P_i = P_f$$

$$\vec{v}_i = \vec{0} \quad |\vec{v}_i| = 0$$

$$P_i = (m_f + m_p) \vec{v}_i = 0$$

$$P_f = -m_f v_f + m_p v_p = 0 \Rightarrow m_f v_f = m_p v_p$$

## ESEMPIO

$$m_{\text{proiettile}} = 50 \text{ gr} = 5 \times 10^{-2} \text{ kg}$$

$$m_{\text{fucile}} = 2 \text{ kg}$$

$$v_{\text{proiettile}} = 400 \frac{\text{m}}{\text{s}} = 4 \times 10^2 \frac{\text{m}}{\text{s}}$$

? =  $v_{\text{fucile}}$

## SVOLGIMENTO

$P_{i0i} = \text{conservata} \Rightarrow$

$$P_{i0i} = P_{f0i}$$

$$P_{i0i} = 0$$

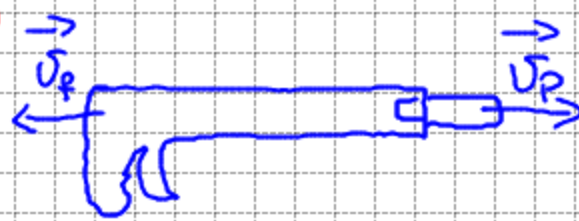
$$P_{f0i} = m_p v_p + m_f v_f$$

$$m_p v_p + m_f v_f = 0$$

$$v_f = - \left( \frac{m_p}{m_f} \right) v_p$$

$$v_f = - \frac{5 \times 10^{-2} \text{ kg} \times 4 \times 10^2 \frac{\text{m}}{\text{s}}}{2 \text{ kg}} = -10 \frac{\text{m}}{\text{s}}$$

$v_f$  è opposta a  $v_p$

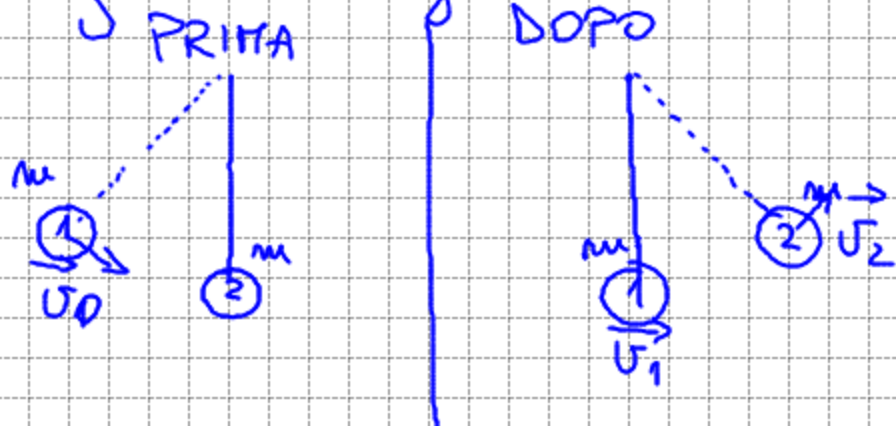


## URT I

URT I ELASTICI: si conserva la quantità di moto e l'energia cinetica.

## ESEMPIO

2 biglie di uguale massa:



$$P_{i0i} = P_{f0i}$$

$$m v_0 + m(0) = m v_1 + m v_2$$

$$E_{i0i} = E_{f0i}$$

$$\frac{1}{2} m v_0^2 = \frac{1}{2} m v_1^2 + \frac{1}{2} m v_2^2$$

$$\begin{cases} v_0 = v_1 + v_2 \\ v_0^2 = v_1^2 + v_2^2 \end{cases} \rightarrow \begin{cases} v_2 = v_0 - v_1 \\ v_0^2 = v_1^2 + (v_0 - v_1)^2 \end{cases} \rightarrow v_0^2 = v_1^2 + v_0^2 + v_1^2 - 2v_0v_1$$

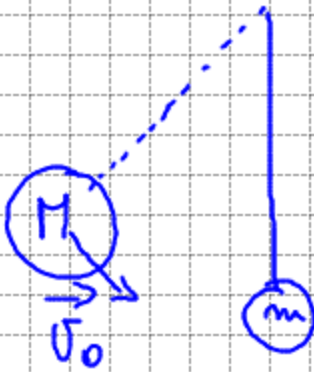
$$\begin{cases} v_2 = v_0 - v_1 \\ 2v_1(v_1 - v_0) = 0 \end{cases} \rightarrow \begin{cases} v_1 = 0 \\ v_2 = v_0 \end{cases} \text{ or } \begin{cases} v_1 = v_0 \\ v_2 = 0 \end{cases} \text{ impossibile}$$



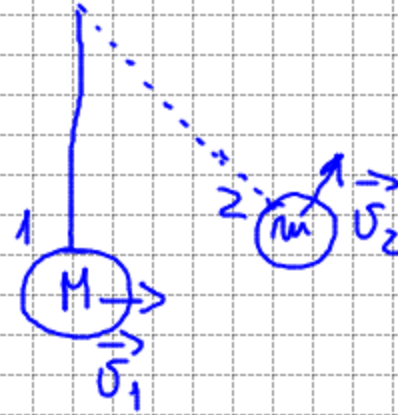
### ESEMPIO

Due biglie di massa  $m$  e  $M$ ;  $M > m$

PRIMA



DOPPO



$$\begin{cases} p_{im} = p_{fim} \\ E_{im} = E_{fim} \end{cases}$$