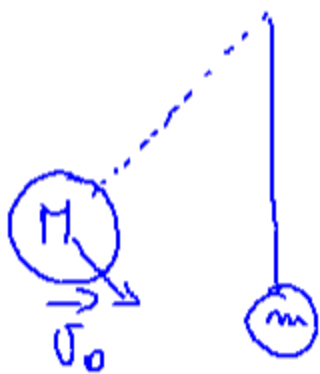


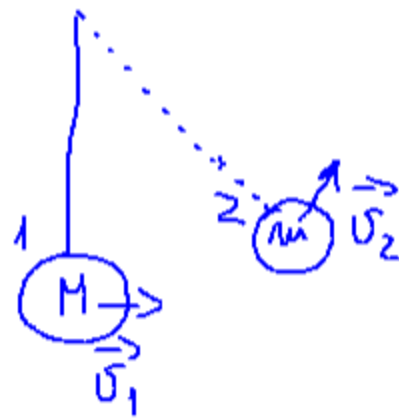
## ESEMPIO

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

PRIMA



DOPPO



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

$$\begin{cases} M v_0 + m \cdot 0 = M v_1 + m v_2 \\ \frac{1}{2} M v_0^2 + \frac{1}{2} m (0)^2 = \frac{1}{2} M v_1^2 + \frac{1}{2} m v_2^2 \end{cases}$$

$$\begin{cases} M v_0 = M v_1 + m v_2 \rightarrow \begin{cases} M v_1 = M v_0 - m v_2 \\ M v_0^2 = M v_1^2 + m v_2^2 \end{cases} \\ M v_0^2 = M \left( \frac{M v_0 - m v_2}{M} \right)^2 + m v_2^2 \end{cases}$$

$$\begin{cases} v_1 = \frac{M v_0 - m v_2}{M} \\ \cancel{M v_0^2} = \cancel{\frac{M^2 v_0^2}{M}} + \frac{m^2 v_2^2}{M} - \frac{2 M m v_0 v_2}{M} + m v_2^2 \end{cases}$$

$$\begin{cases} v_1 = \frac{M v_0 - m v_2}{M} \\ m^2 v_2^2 - 2 M m v_0 v_2 + M m v_2^2 = 0 \rightarrow m v_2 (m v_2 - 2 M v_0 + M v_2) = 0 \end{cases}$$

$m v_2 = 0 \rightarrow v_2 = 0$  IMPOSSIBILE !!!

$$(m + M) v_2 = 2 M v_0 \rightarrow \boxed{v_2 = \frac{2 M}{M + m} v_0}$$

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

$$v_1 = \frac{M (M v_0 - m v_0)}{M (m + M)}$$

$$\boxed{v_1 = \frac{M - m}{m + M} v_0}$$