

**Soluzioni 26 10 06**

26/10/06

Es. 1

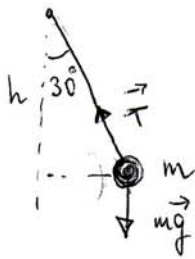
$$v_f = 80 \text{ km/h} \equiv 22.22 \text{ m/s} \quad v_i = 100 \text{ km/h} = 27.78 \text{ m/s}$$

$$(a) \quad a = \frac{v_f^2 - v_i^2}{2(x - x_i)} = \frac{(22.22)^2 - (27.78)^2 \text{ m}^2/\text{s}^2}{2 \cdot 88 \text{ m}}$$

$$= -1.58 \text{ m/s}^2 = -1.58 \cdot 10^{-3} \frac{\text{km}}{(3600)^2 \text{ h}^2} = -1.58 \cdot 10^{-3} \cdot (3.6)^2 \cdot 10^6 \frac{\text{km}}{\text{h}^2}$$

$$= -20477 \frac{\text{km}}{\text{h}^2}$$

$$(b) \quad t = \frac{v_f - v_i}{a} = 3.519 \text{ s}$$

Es. 2

$$l = 1 \text{ m} \quad \theta = 30^\circ$$

Conserv. energie:  $h = l \cdot \cos 30^\circ$

$$E_{\text{iniz}} \rightarrow mg \cdot l \cdot \cos 30^\circ + 0$$

$$E_{\text{fine}} \rightarrow mg \cdot l \cdot \cos 20^\circ + \frac{1}{2} m v^2$$

$$mg l \cdot \cos 30^\circ = mg l \cos 20^\circ + \frac{1}{2} m v^2$$

$$v^2 = 2 \cdot g l (\cos 30^\circ - \cos 20^\circ) =$$

$$= 2 \cdot 9.8 \cdot 1 \cdot (0.87 - 0.94) = 1.372 \frac{\text{m}^2}{\text{s}^2}$$

$$v = 1.17 \text{ m/s}$$

Es. 3

$$P_1 + \frac{1}{2} \rho v_1^2 + \rho g h_1 = P_2 + \frac{1}{2} \rho v_2^2 + \rho g h_2$$

$$A_1 v_1 = A_2 v_2 \quad v_2 = \frac{A_1 v_1}{A_2}$$

$$P_1 - P_2 = \frac{1}{2} \rho v_2^2 - \frac{1}{2} \rho v_1^2$$

$$\Delta P = \frac{1}{2} \rho (v_2^2 - v_1^2) = \frac{1}{2} \rho \left[ \left( \frac{A_1 v_1}{A_2} \right)^2 - v_1^2 \right] =$$

$$= \frac{1}{2} \rho [4v_1^2 - v_1^2] = \frac{1}{2} \rho \cdot 3v_1^2$$

$$v_1 = 1.86 \text{ m/s} \quad v_2 = 3.72 \text{ m/s}$$

$$Q = A_2 v_2 = 2.2 \cdot 10^{-3} \text{ m}^3/\text{s}$$

### ES-4

(a) Il sistema svolge  $W$  positivo perché  $V$  cresce.

$$W = p(V_f - V_i) = (1.01 \cdot 10^5 \text{ Pa}) \cdot (1.671 \text{ m}^3 - 1.00 \cdot 10^{-3} \text{ m}^3) = \\ = 169 \text{ kJ}$$

$$(b) Q = L_v \cdot m = (2260 \text{ kJ/kg}) \cdot 1 \text{ kg} = 2260 \text{ kJ}$$

### ES-5

$$\begin{cases} 18 - 12I - 6I_1 = 0 \\ 6I_1 - I_2 + 12 - I_2 = 0 \\ I_1 + I_2 = I \end{cases} \begin{cases} I = 2 \text{ A} \\ I_2 = 3 \text{ A} \\ I_1 = -1 \text{ A} \end{cases}$$