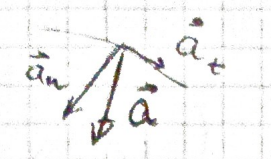


12.2.2025. Fisica 1 - Soluzioni

Encl.

1. $\Delta = A \cdot t$



$$a = \sqrt{a_t^2 + a_n^2}$$

$$a_t = \Delta \cdot R$$

$$a_n = \omega^2 \cdot R, \quad \omega = \int \Delta(t) dt = \int A t dt = A \frac{t^2}{2}$$

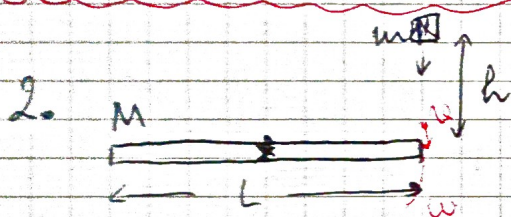
$$a_t(T, D) = \Delta \cdot D = A \cdot T \cdot D$$

$$a_n(T, D) = \left(\frac{A T^2}{2} \right)^2 \cdot D = \frac{A^2 T^4 D}{4}$$

$$a = \sqrt{\frac{A^2 T^2 D^2}{16} + \frac{A^4 T^8 D^2}{16}} = \frac{A T D}{4} \sqrt{1 + \frac{A^2 T^6}{16}}$$

Dim: $\frac{\text{rad}^2}{\text{s}^2} \cdot \text{s}^6 = \text{rad}^2$

OK



$$\vec{L}_{\text{prima}} = \vec{L}_{\text{dopo}}$$

$$m v \frac{L}{2} = I_{\text{tot}} \cdot \omega \Rightarrow \omega = \frac{m v L}{2 I_{\text{tot}}}$$

$$v = ?$$

$$\downarrow$$

$$mgh = m \frac{v^2}{2} \Rightarrow v = \sqrt{2gh}$$

$$I_{\text{tot}} = ?$$

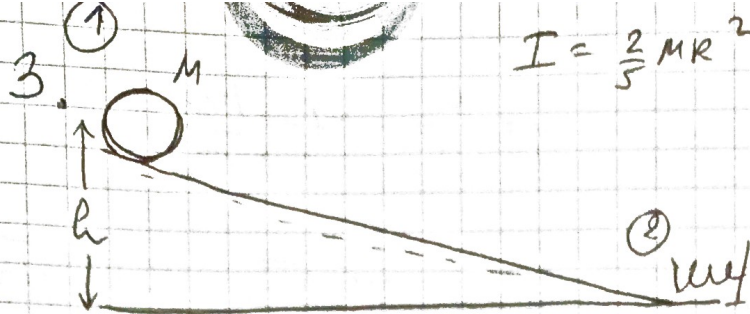
$$I_{\text{tot}} = I_M + I_m = \frac{M L^2}{12} + m \cdot \left(\frac{L}{2} \right)^2 = \frac{M L^2}{12} + \frac{m L^2}{4} = \frac{L^2}{12} (M + 3m)$$

$$\Rightarrow \omega = \frac{\sqrt{2gh} \cdot m \cdot L}{2 \cdot \frac{L^2}{12} (M + 3m)} = \frac{6 \sqrt{2gh} m}{L (M + 3m)}$$

Dim: $\frac{\text{m}}{\text{s}} \cdot \frac{\text{m}}{\text{m}} = \frac{\text{m}}{\text{s}}$

OK

$$I = \frac{2}{5} MR^2$$

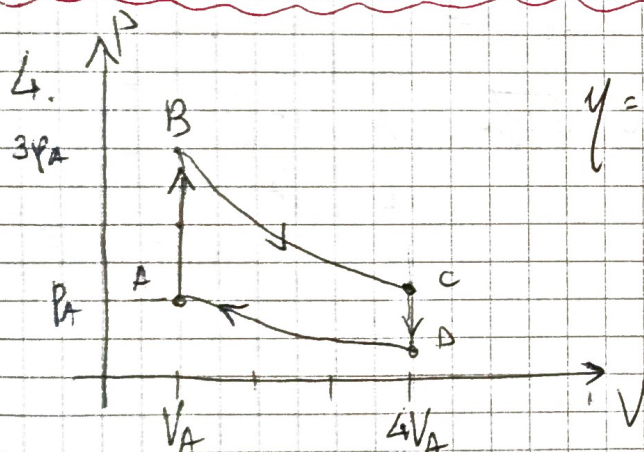


$$E_1 = E_2$$

$$Mgh = M\frac{v^2}{2} + I\frac{\omega^2}{2} \quad \text{pure rot. } (\omega = \frac{v}{R}) \quad M\frac{v^2}{2} + \frac{2}{5} MR^2 \frac{v^2}{2R^2} = \frac{7}{5} M\frac{v^2}{2}$$

$$\Rightarrow \textcircled{a} \quad Mgh = \frac{7Mv^2}{10} \Rightarrow v = \sqrt{\frac{10}{7}gh}$$

$$\textcircled{b} \quad E_1 = E_2 = E_3 \quad Mgh = k\frac{x^2}{2} \Rightarrow x = \sqrt{\frac{2Mgh}{k}}$$



$$\eta = \frac{W}{Q_{\text{ass}}} = 1 - \frac{|Q_{\text{cool}}|}{Q_{\text{ass}}}$$

$$|Q_{\text{cool}}| = nC_V (T_C - T_D)$$

$$Q_{\text{ass}} = nC_V (T_B - T_A)$$

	P	V	T
A	P_A	V_A	T_A
B	$3P_A$	V_A	$3T_A$
C		$4V_A$	$3T_A 4^{1-\gamma}$
D		$4V_A$	$T_A 4^{1-\gamma}$

$$\text{ad. } TV^{\gamma-1} = \text{const}$$

$$T_B V_B^{\gamma-1} = T_C V_C^{\gamma-1} \Rightarrow 3T_A V_A^{\gamma-1} = T_C (4V_A)^{\gamma-1}$$

$$\Rightarrow T_C = 3T_A \frac{V_A^{\gamma-1}}{4^{\gamma-1} V_A^{\gamma-1}} = 3T_A 4^{1-\gamma}$$

$$\text{ad. } T_A V_A^{\gamma-1} = T_D (4V_A)^{\gamma-1}$$

$$\Rightarrow T_D = T_A \frac{V_A^{\gamma-1}}{4^{\gamma-1} V_A^{\gamma-1}} = T_A 4^{1-\gamma}$$

$$\Rightarrow \eta = 1 - \frac{T_C - T_D}{T_B - T_A} = 1 - \frac{T_A 4^{1-\gamma} (3-1)}{T_A (3-1)} \Rightarrow$$

$$\boxed{\eta = 1 - 4^{1-\gamma}}$$