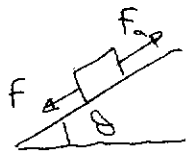
1 a)



$\sin(\vartheta) = 0.05$

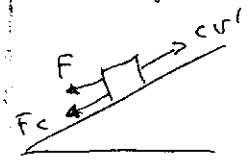
$F_a = cv \qquad F = mg\sin(\vartheta)$

$ma = 0 = F - F_a \qquad cv = mg\sin(\vartheta) \qquad v = 10\frac{km}{h} = \frac{10}{3.6}\ m/s$

b) $v' = \frac{26}{3.6}\ m/s$

$Potenza = F_c \cdot v$

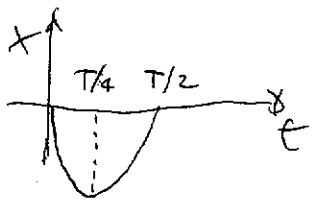
$0 = mg\sin(\vartheta) + F_c - cv'$



2 a) $v = \frac{72}{3.6}\ m/s \qquad \frac{1}{2}mv^2 = \frac{1}{2}kx^2$

$x = 2.5\ m$

b) $|F_{mol}| = kx$; se m fosse attaccata alla molla compirebbe un moto armonico semplice, ma a $\frac{T}{2}$ si stacca e a $\frac{T}{4}$ si ha massima compressione e inversione del moto



(in fig. x è positivo orientato verso sinistra)

$\omega = \frac{2\pi}{T} = \sqrt{\frac{k}{m}}$

3 a) $\omega = 9\ rpm = \frac{9 \times 2\pi}{60}\ rad/s$ $\quad \omega_0 = 0$ $\quad \Delta t = 5 \times 60\ s$

$\alpha = \frac{\omega - \omega_0}{\Delta t}$ $\quad I\alpha = \tau = 4\,F\,R$ $\quad R = 15\ m$

F forza esercitata da ognuno dei razzi

b)

$a_c = \omega^2 R$ $\quad$ peso apparente $\equiv F_N$

$F_N = m\,a_c$

4 a) $|F| = \frac{q_e^2}{4\pi\varepsilon_0 r^2}$

b) $m\,a_c = F$ $\quad a_c = \omega^2 r$ $\quad \omega = \frac{2\pi}{T}$ $\quad T \equiv$ periodo

$E_{tot} = \frac{1}{2} m v^2 + PE$ $\quad v = \omega r$

$PE = -\frac{q^2}{4\pi\varepsilon_0 r}$

5 a) $P_{of} = \frac{V^2}{R}$ $\quad R = \frac{220^2}{1000}$; a $110\,V$ $\Rightarrow$ $P_{of} = \frac{110^2}{R}$

b) $R = \rho \frac{l}{S}$ $\quad S = \pi \left(\frac{d}{2}\right)^2$

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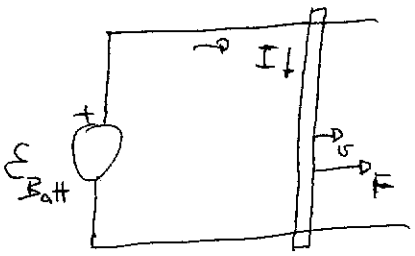

a) $F = I L B$ $\quad F = ma$ (se B è diretto dentro al foglio)

$v^2 = v_0^2 + 2as$ $\quad v_0 = 0$ $\quad a = \frac{v^2}{2s}$

$ma = ILB$ $\quad I = \frac{ma}{LB}$ $\quad \mathcal{E}_{Batt} = I \cdot R$

b) f.e.m. indotta $\mathcal{E} = \frac{d\Phi_B}{dt} = B\frac{dA}{dt} = B \cdot L\frac{ds}{dt}$

$= BLv$

la $\mathcal{E}$ indotta ha verso opposto a $\mathcal{E}_{Batt}$ e la annulla quando $BLv_{lim} = \mathcal{E}_{Batt}$

7 a) all'equilibrio $mg = F_B$ $\quad F_B$ = spinta Archimede

$(\rho_{legno} V_t) g = (\rho_{acqua} V_i) g$ $\quad V_t$ = volume totale

V_i = vol. immerso

$V_i = \frac{\rho_{legno}}{\rho_{acqua}} V_t$ $\quad V_t = \frac{m}{\rho_{legno}}$

b) $(m + m_{piombo}) g = \rho_{acqua} V_t g$

$m_{piombo} = \rho_{piombo} V_{piombo}$ $\quad V_{piombo} = \frac{4}{3}\pi r^3$