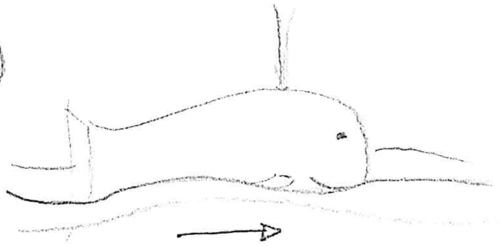
(1)



$v_i = 1{,}0 \ m/s$

$v_f = 2{,}5 \ m/s$

$\bar{a} = 0{,}15 \ \dfrac{m}{s^2}$

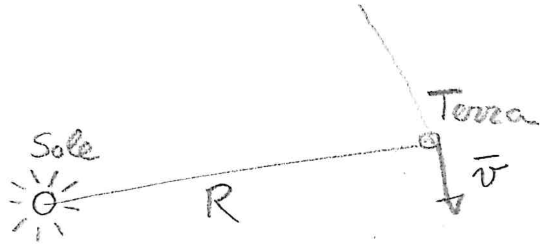
a) $a = \dfrac{v_f - v_i}{\Delta t}$

$$\Delta t = \frac{v_f - v_i}{a} = \frac{2{,}5 \ m/s - 1{,}0 \ m/s}{0{,}15 \ m/s^2} = 10 \ s$$

b) $v_f^{\,2} = v_i^{\,2} + 2a\Delta x$

$$\Delta x = \frac{v_f^{\,2} - v_i^{\,2}}{2a} = \frac{6{,}25 \ \frac{m^2}{s^2} - 1{,}0 \ m^2/s^2}{2 \cdot 0{,}15 \ m/s^2} = 17{,}5 \ m$$

(2)



$T = 365{,}25$ giorni

$R = 1{,}5 \cdot 10^{11}$ Km

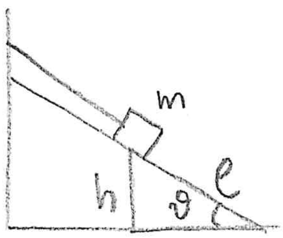
$\;\;= 1{,}5 \cdot 10^{14}$ m

a) $$v = \frac{2\pi R}{T} = \frac{2\pi \cdot 1{,}5 \cdot 10^{14} \ m}{3{,}16 \cdot 10^{7} \ s} = 3{,}0 \cdot 10^{7} \ \frac{m}{s}$$

con $T = 365{,}25 \cdot 24 \cdot 3600 \ s = 3{,}16 \cdot 10^{7} \ s$

b) $$a_c = \frac{v^2}{R} = 5{,}95 \ \frac{m}{s^2}$$

(3)



$m = 1{,}0 \ kg$

$h = 1{,}50 \ m$, $\ell = 2h = 3{,}0 \ m$

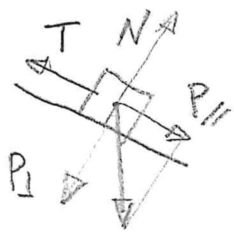
$\vartheta = 30°$

a) $T = P_{/\!/} = P \operatorname{sen}\vartheta$

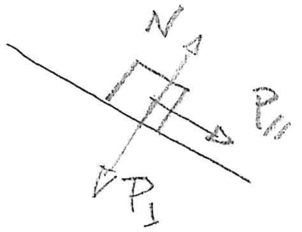
$\;\;= mg \operatorname{sen}\vartheta = \frac{1}{2} mg$

$\;\;= 1{,}0 \ kg \cdot 9{,}8 \ \frac{m}{s^2} \cdot \frac{1}{2}$

$\;\;= 4{,}9 \ N$



b) Una volta spezzata la fune, si ha che l'unica forza non equilibrata è $P_{//} = \frac{1}{2} mg$



b) $a = \frac{P_{//}}{m} = \frac{\frac{1}{2} mg}{m} = \frac{1}{2} g = 4,9 \ \frac{m}{s^2}$

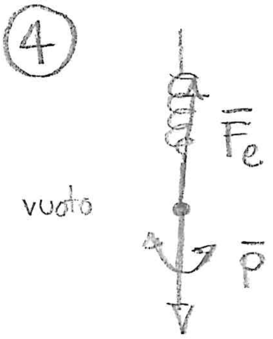
c) $v^2 = \cancel{v_i^2} + 2a \cdot \ell$

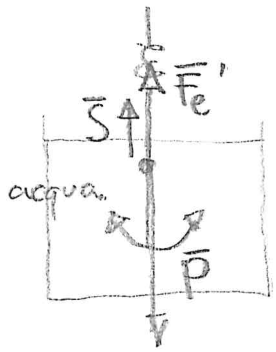
il blocco parte da fermo

$v = \sqrt{2a\ell} = \sqrt{2 \cdot \frac{1}{2} g \cdot \ell} = \sqrt{2gh} = \sqrt{g\ell}$

$= \sqrt{9,8 \ \frac{m}{s^2} \cdot 3,0 \ m} = 5,42 \ m/s$

4





$k = 2000 \ \frac{N}{m}$

$\Delta x = 60 \ cm = 0,60 \ m$

$\Delta x' = 50 \ cm = 0,50 \ m$

In vuoto, $\overline{P} + \overline{F_e} = 0$, ovvero $P = F_e$, con $F_e = k\Delta x$

In acqua, la spinta di Archimede $\overline{S}$ "aiuta" la forza elastica a sostenere $\overline{P}$:

$\overline{P} + \overline{F_e}' + \overline{S} = 0$, ovvero $P = F_e' + S$, con $F_e' = k\Delta x'$

e $S = \rho_a V g$

a) Mettendo a sistema:

$\begin{cases} P = F_e \\ P = F_e' + S \end{cases} \Rightarrow F_e = F_e' + S \Rightarrow S = F_e - F_e'$

$\rho_a V g = k\Delta x - k\Delta x'$

$V = \frac{k(\Delta x - \Delta x')}{\rho_a g} = 2 \cdot 10^{-2} \ m^3$

b) $\rho = \frac{m}{V}$ con m dato da $P = F_e$ ovvero $mg = k\Delta x$.

$\rho = \frac{m}{V} = \frac{\frac{\cancel{k}\Delta x}{\cancel{g}}}{\frac{\cancel{k}(\Delta x - \Delta x')}{\rho_a \cancel{g}}} = \rho_a \frac{\Delta x}{\Delta x - \Delta x'} = 1000 \ \frac{kg}{m^3} \cdot \frac{60 \ cm}{10 \ cm} = 6000 \ \frac{kg}{m^3}$