1/ CANNONE

$m_c = 375\,kg$ $\quad m_p = 12\,kg$

$a_c = ?$ $\quad a_p = 50\,\frac{m}{s^2}$

(A) 3° P.D.: $F_c = F_p$

2° P.D.: $m_c a_c = m_p a_p \Rightarrow a_c = \frac{m_p a_p}{m_c} = \frac{12\,kg}{375\,kg} \cdot 50\,\frac{m}{s^2} = 1{,}6\,\frac{m}{s^2}$

(B) $F_{TOT} = F_c + F_p = m_c a_c + m_p a_p = 375\,kg \cdot 1{,}6\,\frac{m}{s^2} + 12\,kg \cdot 50\,\frac{m}{s^2} = 600\,N + 600\,N = 1200\,N$

(C) M.R.U.A. $s = \frac{1}{2} a t^2 = \frac{1}{2} 1{,}6\,\frac{m}{s^2} \cdot (0{,}5\,s)^2 = 0{,}2\,m$

2/ BILANCIA in ascensore

$m = 90\,kg$

(A) FERMO $P = m \cdot g = 90\,kg \cdot 9{,}8\,\frac{m}{s^2} = 882\,N$

(B) $a \downarrow$ $a = 0{,}8\,\frac{m}{s^2}$ $P = m(g-a) = 90\,kg \cdot (9{,}8 - 0{,}8)\,\frac{m}{s^2} = 810\,N$

(C) $V = cost$ $V = 1{,}5\,\frac{m}{s}$ $P = m \cdot g = \dots = 882\,N$

M.R.U.

(D) $a \uparrow$ $1{,}2\,\frac{m}{s^2}$ $P = m(g+a) = 90\,kg\,(9.8 + 1{,}2)\,\frac{m}{s^2} = 990\,N$

3/ F. CENTRIPETA $F_c = m \cdot a_c = m \cdot \frac{v^2}{R} = m \omega^2 R$

$V = \frac{2\pi R}{T} = \omega \cdot R$ M.C.U.

$m = 8\,g$

$R = 5{,}9\,cm$

$\mu = 0{,}95$

$\omega = ?$

$f = ?$

(A) $F_{CENTR.} = F_{ATT}$

$m \cdot \frac{v^2}{R} = \mu F_\perp$

$m \cdot \omega^2 \cdot R = \mu \cdot m g \rightarrow \omega = \sqrt{\frac{\mu g}{R}} = \sqrt{\frac{0{,}95 \cdot 9{,}8\ \frac{m}{s^2}}{0{,}059\ m}} = 12{,}6\ \frac{RAD}{s}$

$\omega = \frac{2\pi}{T} = 2\pi f \rightarrow f = \frac{\omega}{2\pi} = \frac{12{,}6\ \frac{RAD}{s}}{2\pi\ RAD} = 2\ Hz$

(B) $F_{CENTR} = m \omega^2 \cdot R = 8 \cdot 10^{-3}\ kg \cdot \left(12{,}6\ \frac{RAD}{s}\right)^2 \cdot 0{,}059\ m = 0{,}0745\ N$

4 PENDOLO $T = 2\pi\sqrt{\frac{\ell}{g}}$

$\ell = 1{,}2\ m$

100 oscillazioni in 280 s

$T = \frac{280\ s}{100} = 2{,}8\ s$

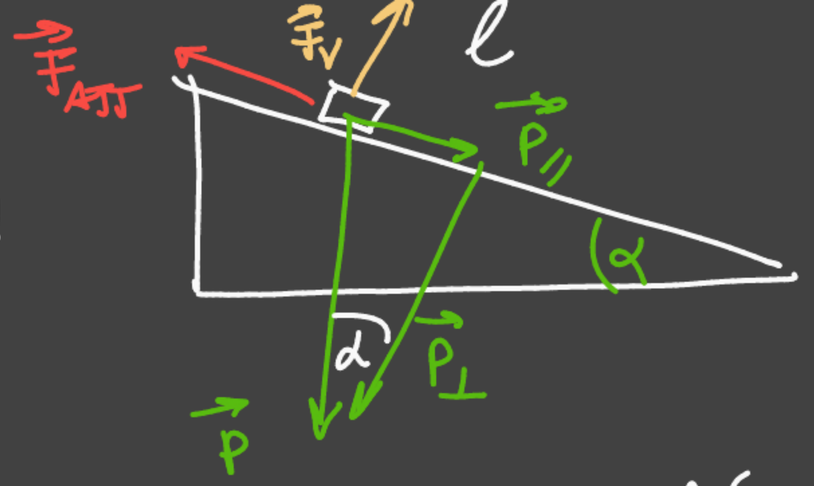
(A) $T^2 = 4\pi^2 \cdot \frac{\ell}{g} \longrightarrow g = \frac{4\pi^2 \ell}{T^2} = \frac{4\pi^2 \cdot 1{,}2\ m}{(2{,}8\ s)^2} = 6{,}04\ \frac{m}{s^2}$

(B) $P_{TERRA} = 800\ N = m \cdot g_T \rightarrow m = \frac{800\ N}{9{,}8\ \frac{m}{s^2}} = 81{,}5\ kg$

$P_{PIANETA} = m \cdot g_P = 81{,}5\ kg \cdot 6{,}04\ \frac{m}{s^2} = 492{,}3\ N$

5/ PIANO INCLINATO

$m = 60\ kg$
$h = 2\ m$
$\ell = 5\ m$
$\mu = 0{,}3$



(A) $\alpha = ?$ $\quad \sin\alpha = \frac{h}{\ell} = \frac{2}{5}$

$\alpha = \sin^{-1}\frac{h}{\ell} = \sin^{-1}\frac{2}{5} = 23{,}6°$

(B) $P_{//} = P\sin\alpha = m \cdot g \cdot \sin\alpha = 60\ kg \cdot 9{,}8\ \frac{m}{s^2} \cdot \sin 23{,}6° = 235{,}4\ N$

(C) $F_{ATT} = \mu F_\perp = \mu\, mg\cos\alpha$ $\quad F_{ATT} = 0{,}3 \cdot 60\ kg \cdot 9{,}8\ \frac{m}{s^2} \cdot \cos 23{,}6° = 161{,}7\ N$

(D) $F_{RIS} = P_{//} - F_{ATT} = (235{,}4 - 161{,}7)\ N = 73{,}7\ N$

(E) $F = ma \rightarrow a = \frac{F_{RIS}}{m} = \frac{73{,}7\ N}{60\ kg} = 1{,}23\ \frac{m}{s^2}$

(E) oppure

$a = g\sin\alpha - \mu g\cos\alpha = g(\sin\alpha - \mu\cos\alpha) =$

$= 9{,}8\ \frac{m}{s^2}(\sin 23{,}6° - 0{,}3\cos 23{,}6°) = 1{,}23\ \frac{m}{s^2}$