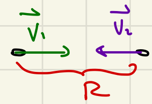
Pag 311 n 138

$m_1 = 4 \cdot 10^9\ kg$

$m_2 = 2m_1$

$R = 6{,}67 \cdot 10^3\ km$ alla fine

(B)



$K_{TOT} = ?$, $\vec{V}_{CM} = ?$, $v_1 = ?$

$G = 6{,}67 \cdot 10^{-11} \cdot \frac{N}{kg^2} \cdot m^2$

$E_\infty = K_\infty + U_\infty = 0 + 0$

$R = 6{,}67 \cdot 10^6\ m$

$E_B = K_{TOT,B} + U_B$

Dato che $E_\infty = E_B$ $\quad 0 = K_{TOT,B} + U_B \leadsto K_{TOT,B} = -U_B = G\frac{m_1 m_2}{R}$

$K_{TOT,B} = \frac{G}{R} 2m_1^2 = 10^{-17} \cdot 2 \cdot (4 \cdot 10^9)^2\ J = 320\ J$

$\vec{P}_{TOT} = m_{TOT} \cdot \vec{V}_{CM}$ $\qquad \vec{P}_{TOT} = 0$ (poiché all'inizio tutto è fermo)

$0 = m_{TOT} \cdot \vec{V}_{CM} \Rightarrow \vec{V}_{CM} = 0$

$$\begin{matrix} E_\infty = E_B \\ P_\infty = P_B \end{matrix} \left\{ \begin{array}{l} 0 = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 + \left(-G\frac{m_1 m_2}{R}\right) \\ 0 = m_1 v_1 - m_2 v_2 \end{array} \right.$$

$m_2 = 2m_1$

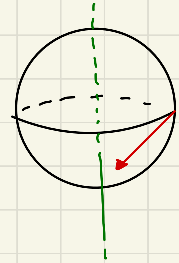
$$\left\{ \begin{array}{l} 2v_2 = v_1 \\ 0 = \frac{1}{2} \cancel{m_1} v_1^2 + \frac{1}{\cancel{2}} \cancel{2}\cancel{m_1} \cdot 4 v_1^2 - G\frac{\cancel{m_1} 2m_1}{R} \end{array} \right.$$

$\frac{9}{2} v_1^2 = \frac{2Gm_1}{R} \leadsto v_1^2 = \frac{4}{9}\frac{Gm_1}{R} \leadsto v_1 = \frac{2}{3}\sqrt{\frac{Gm_1}{R}}$

Pag 343 n 6

$m_X = M_T$

$R_X = \frac{R_T}{2}$



$L_T = I_T \cdot \omega_T \qquad L_T = L_X$

Quanto dura un giorno nel pianeta X, e la velocità di fuga da X.

T_X periodo

$T_X = \frac{2\pi r}{v} = \frac{2\pi}{\omega_X}$

$L_T = \boxed{I_T \cdot \omega_T = I_X \cdot \omega_X} = L_X$

Remind: $I_{sfera} = \frac{2}{5} M_T R_T^2$

Dato che $T_T = \frac{2\pi}{\omega_T}$

$\omega_T = \frac{2\pi}{T_T}$

$\cancel{\frac{2}{5}} M_T R_T^2 \omega_T = \cancel{\frac{2}{5}} m_X \cdot R_X^2 \cdot \omega_X$

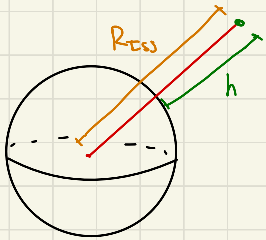
$\cancel{M_T} \cdot \cancel{R_T^2} \omega_T = \cancel{M_T} \cdot \left(\frac{\cancel{R_T}}{2}\right)^2 \cdot \omega_X$

$\omega_X = 4\omega_T \qquad \omega_X = 4 \frac{2\pi}{T_T}$

$T_X = \frac{2\pi}{4 \cdot 2\pi} \cdot T_T = \frac{T_T}{4}$ ⇝ Un giorno su X dura 6 ore

$v_{f,X}^2 = \frac{2G m_X}{R_X} = \underbrace{2G \frac{M_T}{R_T}}_{v_{f,T}^2} \cdot 2 = 2 v_{f,T}^2$ ⇝ $v_{f,X} = \sqrt{2}\, v_{f,T}$

Es 3 pag 313



$h = 408\ km$ $\quad R_T, M_T$ dati

$T_{ISS} = ?$

$$T_{ISS} = \frac{2\pi R_{ISS}}{V_{ISS}} = \frac{2\pi (R_T + h)}{V_{ISS}}$$

$$V_{ISS}^2 = \frac{G M_T}{R_T + h}$$

$$T_{ISS}^2 = \frac{4\pi^2 (R_T+h)^2 (R_T+h)}{G M_T}$$

$$1 : T_{ISS} = x : T_T$$

$$x = \frac{T_T}{T_{ISS}} = \dots = 15$$