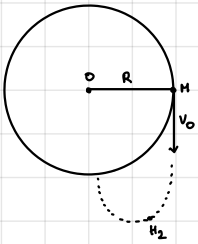
ESERCITAZIONE

ESERCIZIO 3 (11)

2)



$V_0 = \frac{3}{4}\sqrt{2\gamma \frac{M}{R}}$

$L_0 = L_F \Rightarrow m v_0 R = m v_F (R + H_2)$

$R v_0 = (R + H_2) v_F$

$E_0 = E_F \Rightarrow \frac{1}{2} m v_0^2 - \gamma \frac{mM}{R} = \frac{1}{2} m v_F^2 - \gamma \frac{mM}{R+H_2} \quad * 2\frac{R^2(R+H_2)^2}{m}$

$R^2 v_0^2 (R+H_2)^2 - 2\gamma M R (R+H_2)^2 = R^2 (R+H_2)^2 v_F^2 - 2\gamma M R^2 (R+H_2)$

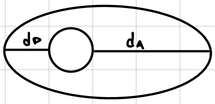
$R v_0^2 [(R+H_2)^2 - R^2] = 2\gamma M (R+H_2) H_2$

$R V_0^2 [(R+H_2) + R] = 2\gamma M (R+H_2)$

$\left(\frac{2\gamma M}{R v_0^2} - 1\right)(R+H_2) = R$

$H_2 = \frac{R}{\frac{2\gamma M}{R v_0^2} - 1} - R \quad \dots \quad H_2 = \frac{2}{7} R$

ESERCIZIO 5 (11)



$d_P = 500 Km \qquad d_A = 6 d_P$

$\begin{cases} L_P = L_A \\ E_P = E_A \end{cases} \qquad \begin{cases} \cancel{m} r_P v_P = \cancel{m} r_A v_A \\ \frac{1}{2} \cancel{m} v_P^2 - \gamma \frac{\cancel{m} M}{r_P} = \frac{1}{2} \cancel{m} v_A^2 - \gamma \frac{\cancel{m} M}{r_A} \end{cases}$

$r_A = R + d_A = 9{,}87 \cdot 10^6 \, m$

$r_P = R + d_P = 6{,}87 \cdot 10^6 \, m$

$\begin{cases} r_P v_P = r_A v_A \\ r_A r_P^2 v_P^2 - 2\gamma M r_A r_P = r_A r_P^2 v_A^2 - 2\gamma M r_P^2 \end{cases}$

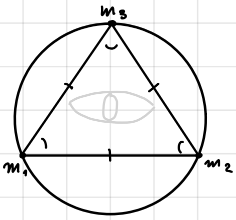
$r_A^3 v_A - 2\gamma M r_A r_P = r_A r_P^2 v_A^2 - 2\gamma M r_P^2$

$r_A (r_A^2 - r_P^2) v_A^2 = 2\gamma M r_P (r_A - r_P)$

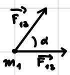
$v_A = \sqrt{\frac{2\gamma M r_P}{r_A (r_A + r_P)}} = \dots = 6 \cdot 10^3 \, m/s$

$\rightarrow v_P = \frac{r_A}{r_P} v_A = \dots = 8{,}18 \cdot 10^3 \, \frac{m}{s}$

ESERCIZIO 7 (11)



$T = ? \qquad \theta = \frac{\pi}{3} \, rad$



$F_{12} = F_{13} = \gamma \frac{m^2}{\ell^2} \Rightarrow \vec{F_1} = \frac{\gamma m^2}{\ell}\left[\left(1 + \frac{1}{2}\right)\hat{u}_x + \frac{\sqrt{3}}{2}\hat{u}_y\right] = \frac{\sqrt{3}}{2}\gamma \frac{m^2}{b^2}(\sqrt{3}\hat{u}_x + \hat{u}_y)$

$F_1 = m a_c \Rightarrow \sqrt{3}\gamma \frac{m^{\cancel{2}}}{\ell^2} = \cancel{m}\frac{v^2}{R} \rightarrow v^2 = \gamma \frac{m}{\ell} \Rightarrow T = 2\pi \sqrt{\frac{\ell^3}{3\gamma m}}$

$R = \frac{b}{\sqrt{3}}$ (geometria)