1-

$$\frac{r_A}{r_P} = 1{,}2 = \frac{12}{10} = \boxed{\frac{6}{5}}$$

a) $\boxed{\vec{p} = m\vec{v}}$

$$\frac{p_A}{p_P} = \frac{\cancel{m} v_A}{\cancel{m} v_B} = \boxed{\frac{5}{6}}$$

$$L_A = L_P$$

$$\cancel{m} r_A v_A \cancel{\sin 90} = \cancel{m} r_P v_P \cancel{\sin 90}$$

$$\frac{r_A}{r_P} = \frac{v_P}{v_A} = \frac{6}{5}$$

b) $\boxed{\vec{L} = \vec{r} \times \vec{p}}$

$$\frac{L_A}{L_P} = 1$$

$$\vec{L} = ct$$

$$\frac{d\vec{L}}{dt} = \vec{M} = \vec{0}$$

$$\vec{M} = \vec{r} \times \vec{F}_g = \vec{0}$$

$$\vec{r} \parallel \vec{F}_g$$

c) $\boxed{E_p = -\dfrac{GMm}{r}}$

$$\frac{E_{p_A}}{E_{p_B}} = \frac{\cancel{-GMm}/r_A}{\cancel{-GMm}/r_P} = \frac{r_P}{r_A} = \boxed{\frac{5}{6}}$$

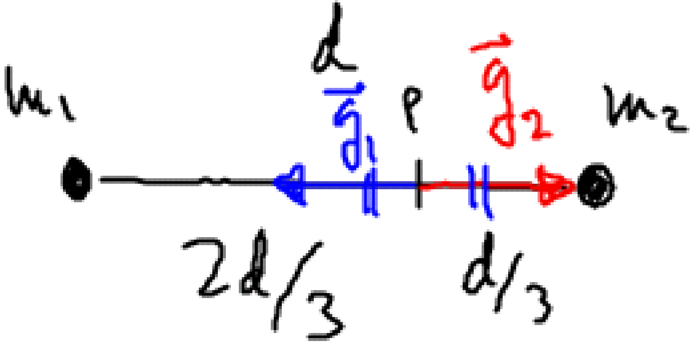
d)

CAMPO CONSERV. $\Rightarrow$ $\Delta E_m = 0$

$W = \oint \vec{F} \cdot d\vec{r} = 0$

$$\boxed{\frac{E_{m_A}}{E_{m_P}} = 1}$$

2-



$$\boxed{\vec{g} = -\frac{GM}{r^2}\,\hat{u}_r}$$

a)

$$\vec{g} = \vec{g}_1 + \vec{g}_2 = \vec{0}$$

$$\Downarrow$$

$$\boxed{\vec{g}_1 = -\vec{g}_2}$$

$$\Downarrow$$

$$g_1 = g_2$$

$$g = \frac{GM}{r^2}$$

$$\frac{\cancel{G}M_1}{(2\cancel{d}/\cancel{3})^2} = \frac{\cancel{G}M_2}{(\cancel{d}/\cancel{3})^2}$$

$$\boxed{M_1 = 4M_2}$$

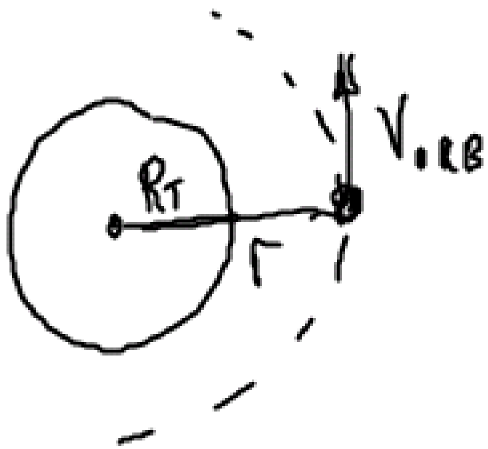
b) $\boxed{V = -\frac{GM}{r}}$ $V_1 = -\frac{GM_1}{2d/3} < 0$

$V_2 = -\frac{GM_2}{d/3} < 0$

$V = V_1 + V_2 < 0$ No.

$$\boxed{V = -\frac{9Gm_2}{d}}$$

3-



La E_m para que el satélite se mantenga en órbita.

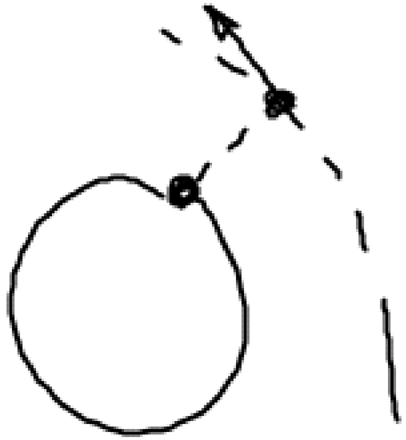
$$E_m = E_p + E_c = -\frac{GMm}{r} + \frac{1}{2}mv_0^2 \, *$$

$$F_c = F_g$$

$$V_{ORB} = \sqrt{\frac{GM}{r}}$$

Si la ORB. CIRC. $\Rightarrow$ $\boxed{E_m = -\frac{1}{2}\frac{GMm}{r}}$

b)

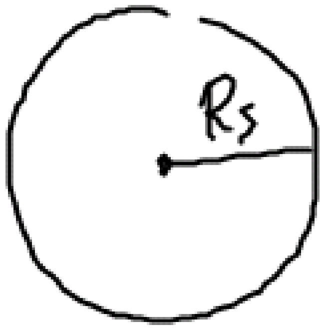


$$\Delta E = \underset{\text{ORB.}}{E_f} - \underset{\text{SUP.}}{E_0} =$$

$$= -\frac{1}{2}\frac{GMm}{r} - \left(-\frac{GMm}{R_T}\right) =$$

$$\boxed{= -GMm\left(\frac{1}{2r} - \frac{1}{R_T}\right)}$$

4-



$M_S = 95{,}2\, M_T$

$R_S = 9{,}5\, R_T$

a) $\boxed{\vec{g} = -\frac{GM}{r^2}\,\hat{u}_r}$

$$g_s = \frac{GM_s}{R_s^2} = \frac{95{,}2}{9{,}5^2}\,\frac{GM_T}{R_T^2} = 10{,}3\ \mathrm{N/kg}$$

$$g_s = \boxed{1{,}05\, g_T}$$

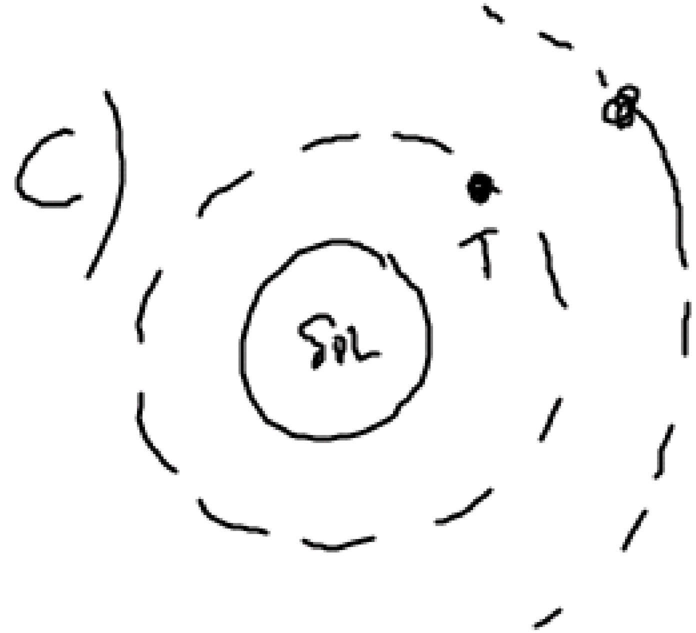
b)

$$T = \frac{2\pi r}{v} \rightarrow T^2 = \frac{4\pi^2}{GM_S} r^3$$

$r = 1221850\,km \approx \underline{\overline{1{,}22 \cdot 10^9\,m}}$

$T = 1{,}38 \cdot 10^6\,s \approx \underline{\overline{16\,d}}$

c)



$$T^2 = K r^3$$

$$\left(\frac{T_{SAT}}{T_T}\right)^2 = \left(\frac{r_{SAT}}{r_T}\right)^3$$

$$T_{SAT} = \sqrt{\left(\frac{r_{SAT}}{r_T}\right)^3} \cdot T_T$$

1 año

$$\boxed{T_{SAT} = 29{,}52 \text{ años}}$$