

$$\textcircled{3} \quad \frac{F_1}{S_1} = \frac{F_2}{S_2} \quad \frac{F_1}{0'011} = \frac{1000}{0'48} \rightarrow F_1 = \frac{1000 \cdot 0'011}{0'48}$$

$$F_1 = ?$$

$$F_1 = \underline{\underline{22'9 \text{ N}}}$$

$$S_1 = M r_1^2 = M 0'06^2 = 0'011 \text{ m}^2$$

$$\phi = 12 \text{ cm} \rightarrow r_1 = 6 \text{ cm} = 0'06 \text{ m}$$

$$F_2 = 1000 \text{ N}$$

$$S_2 = M r_2^2 = M \cdot 0'39^2 = 0'48 \text{ m}^2$$

$$\phi = 78 \text{ cm} \rightarrow r = 39 \text{ cm} = 0'39 \text{ m}$$

$$\textcircled{4} \quad F = G \frac{m_1 \cdot m_2}{d^2} = G \frac{M_{\text{MER}} \cdot m_{\text{per}}}{(R_{\text{MER}})^2} =$$

$$\phi_{\text{MER}} = 4879'4 \text{ km} \rightarrow R_{\text{MER}} = 2439'7 \text{ km} \approx 244 \cdot 10^6 \text{ m}$$

$$F = 667 \cdot 10^{-11} \frac{3'3 \cdot 10^{23} \text{ kg}}{(244 \cdot 10^6)^2} = 247'7 \text{ N}$$

$$m_{\text{SAT}} = 200 \text{ kg}$$

$$h = 3000 \text{ km} = 3 \cdot 10^6 \text{ m}$$

$$F_{\text{SAT}} = G \cdot \frac{m_{\text{SAT}} \cdot M_{\text{MER}}}{(R_{\text{MER}} + h)^2}$$

$$F = 667 \cdot 10^{-11} \cdot \frac{3'3 \cdot 10^{23} \cdot 200}{(2'44 \cdot 10^6 + 3 \cdot 10^6)^2} = \underline{\underline{148'75 \text{ N}}}$$

c)

$$F_c = F_G$$

$$\cancel{m_{SAT}} \cdot \frac{v_{SAT}^2}{\cancel{d}} = G \frac{M_{MER} \cdot \cancel{m_{SAT}}}{d^2}$$

$$d = R_M + h$$

$$v_{SAT} = \sqrt{G \frac{M_{MER}}{(R_M + h)}} = \sqrt{667 \cdot 10^{-11} \frac{3'3 \cdot 10^{23}}{(2'44 \cdot 10^6 + 3 \cdot 10^6)}}$$

$$v_{SAT} = 2011 \frac{\text{m}}{\text{s}}$$

$$d) \frac{T_T^2}{R_T^3} = \frac{T_M^2}{R_M^3} \rightarrow \frac{(365)^2}{(1'49 \cdot 10^{11})^3} = \frac{T_M^2}{(5'79 \cdot 10^{10})^3}$$

$$T_M = \sqrt{\frac{(365)^2 \cdot (5'79 \cdot 10^{10})^3}{(1'49 \cdot 10^{11})^3}} = \sqrt{78174} = \underline{\underline{884 \text{ d}}}$$

$$\textcircled{5} \quad v_{10} = \frac{s}{t} = \frac{2\pi R}{t} = \frac{2 \cdot \pi \cdot 4'22 \cdot 10^8}{1'53 \cdot 10^5} = 17330 \text{ m/s}$$

$$m \frac{v_{10}^2}{d} = G \frac{M_J \cdot m}{d^2}$$

$$M_J = \frac{v_{10}^2 \cdot d}{G} = \frac{17330^2 \cdot 4'22 \cdot 10^8}{6'67 \cdot 10^{-11}} = 1'9 \cdot 10^{27} \text{ Kg}$$