

$$P_A = m_A \cdot g = 0.72 \cdot 9.81 = 7.06 \text{ N}$$

$$P_{XA} = P_A \cdot \sin \alpha = 7.06 \cdot \sin 50^\circ$$

$$P_{XA} = \underline{5.41 \text{ N}}$$

$$P_{YA} = P_A \cdot \cos \alpha = 7.06 \cdot \cos 60^\circ$$

$$P_{YA} = 3.53 \text{ N} \equiv N_A$$

$$F_{RA} = N_A \cdot \mu = 3.53 \cdot 0.05$$

$$F_{RA} = \underline{0.18 \text{ N}}$$

$$P_B = m_B \cdot g = 0.35 \cdot 9.81 = \underline{3.43 \text{ N}}$$

$$P_{XA} - T - F_{RA} = m_A \cdot a$$

$$T - P_B = m_B \cdot a$$

$$P_{XA} - P_B - F_{RA} = (m_A + m_B) \cdot a$$

$$5.41 - 3.43 - 0.18 = (0.72 + 0.35) \cdot a$$

$$a = \frac{1.89}{1.07} = 1.77 \text{ m/s}^2$$

$$\boxed{a = 1.77 \text{ m/s}^2}$$

②

$$M_{\text{MER}} = 3'3 \cdot 10^{23} \text{ Kg}$$

$$\phi_{\text{MER}} = 4879'4 \text{ Km} \rightarrow R_{\text{MER}} = 2'4 \cdot 10^6 \text{ m}$$

$$a) F = G \cdot \frac{M_{\text{MER}} \cdot m_{\text{PER}}}{(R_{\text{MER}})^2} = 6'67 \cdot 10^{-11} \cdot \frac{3'3 \cdot 10^{23} \cdot 40}{(2'4 \cdot 10^6)^2} =$$

$$F = \underline{\underline{269'5 \text{ N}}}$$

$$b) h = 400 \text{ Km} = 4 \cdot 10^5 \text{ m}$$

$$F = G \frac{M_{\text{MER}} \cdot m_{\text{SAT}}}{(R_{\text{SAT}} + h)^2} = 6'67 \cdot 10^{-11} \cdot \frac{3'3 \cdot 10^{23} \cdot 300}{(2'4 \cdot 10^6 + 4 \cdot 10^5)^2} =$$

$$F = \underline{\underline{842'26 \text{ N}}}$$

$$c) F_c = F_g \Rightarrow \cancel{m_{\text{SAT}}} \cdot \frac{v_{\text{SAT}}^2}{(R_M + h)^2} = G \frac{M_{\text{MER}} \cdot \cancel{m_{\text{SAT}}}}{(R_M + h)^2}$$

$$v_{\text{SAT}} = \sqrt{G \cdot \frac{M_{\text{MER}}}{(R_M + h)}} = \sqrt{6'67 \cdot 10^{-11} \cdot \frac{3'3 \cdot 10^{23}}{(2'4 \cdot 10^6 + 4 \cdot 10^5)}} =$$

$$v_{\text{SAT}} = 2803'7 \text{ m/s}$$

$$d) \frac{T_T^2}{R_T^3} = \frac{T_M^2}{R_M^3} \rightarrow \frac{365^2}{(\cancel{5'8 \cdot 10^{10}})^3} = \frac{T_M^2}{(1'5 \cdot 10^{11})^3}$$

$$T_M = \sqrt{\frac{365^2 \cdot (\cancel{1'5 \cdot 10^{11}})^3}{(5'8 \cdot 10^{10})^3}} = \underline{\underline{87'7 \text{ dias}}}$$

③

$$E_{m_A} = E_{m_B} = E_{m_C}$$

$$E_{m_B} = m g h_B + \frac{1}{2} m v_B^2 = 3700 \cdot 981 \cdot 16.5 + \frac{1}{2} 3700 \cdot 12.5^2 =$$

$$v = 3 \text{ 45 km/h} = 12.5 \text{ m/s}$$

$$E_{m_B} = 887963 \text{ J}$$

$$E_{m_A} = m g h_A + \frac{1}{2} m v_A^2 = 3700 \cdot 981 \cdot 5 + \frac{1}{2} 3700 \cdot v_A^2$$

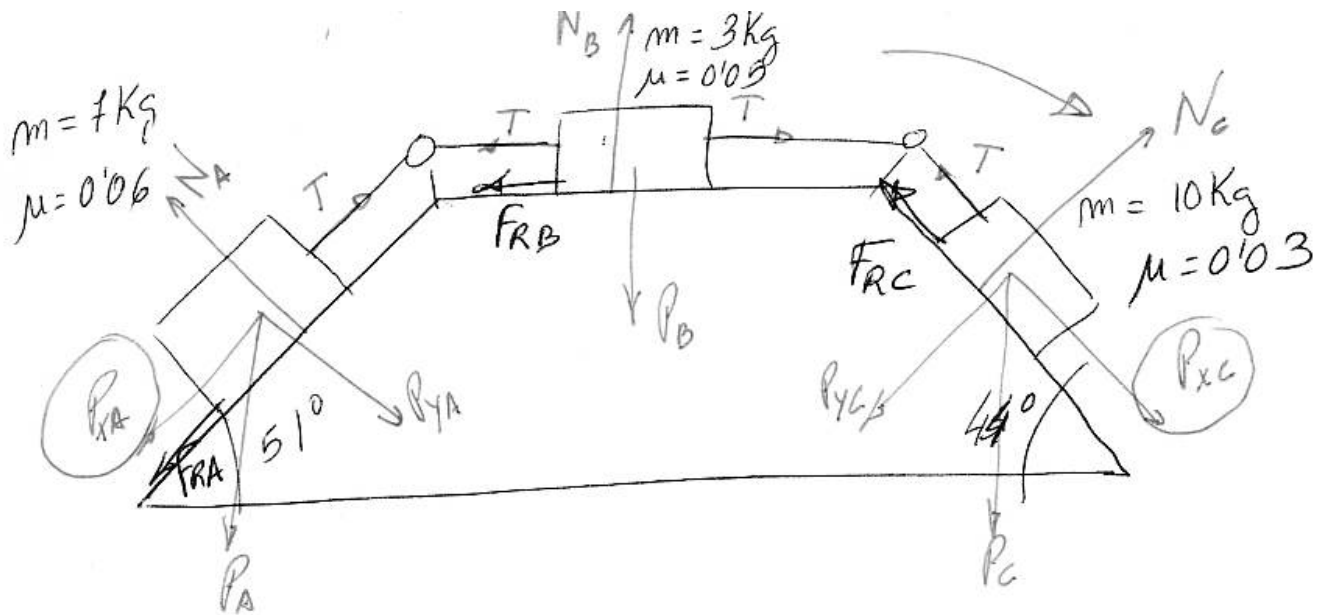
$$887963 = 181485 + 1850 v_A^2$$

$$v_A = \sqrt{\frac{887963 - 181485}{1850}} = 19.5 \text{ m/s}$$

$$E_{m_C} = m g h_C + \frac{1}{2} m v_C^2 = 3700 \cdot 981 \cdot 3.7 + \frac{1}{2} 3700 v_C^2$$

$$887963 = 134298.9 + 1850 v_C^2$$

$$v = \sqrt{\frac{887963 - 134298.9}{1850}} = 20.8 \text{ m/s}$$



$$P_A = m_A \cdot g = 7 \cdot 9.81 = 68.87 \text{ N}$$

$$P_{XA} = P_A \cdot \sin \alpha = 68.87 \cdot \sin 51^\circ = \underline{53.52 \text{ N}}$$

$$P_{YA} = P_A \cdot \cos \alpha = 68.87 \cdot \cos 51^\circ = 43.34 \text{ N} \equiv N_A$$

$$F_{RA} = N_A \cdot \mu_A = 43.34 \cdot 0.06 = \underline{2.6 \text{ N}}$$

$$P_B = m_B \cdot g = 3 \cdot 9.81 = 29.43 \text{ N} \equiv N_B$$

$$F_{RB} = N_B \cdot \mu_B = 29.43 \cdot 0.05 = 1.47 \text{ N}$$

$$P_C = m_C \cdot g = 10 \cdot 9.81 = \underline{98.10 \text{ N}}$$

$$P_{XC} = P_C \cdot \sin \beta = 98.1 \cdot \sin 44^\circ = \underline{68.14 \text{ N}}$$

$$P_{YC} = P_C \cdot \cos \beta = 98.1 \cdot \cos 44^\circ = 70.57 \text{ N} \equiv N_C$$

$$F_{RC} = N_C \cdot \mu_C = 70.57 \cdot 0.03 = \underline{2.12 \text{ N}}$$

$$T - P_{XA} - F_{RA} = m_A \cdot a$$

$$T - T - F_{RB} = m_B \cdot a$$

$$P_{XC} - T - F_{RC} = m_C \cdot a$$

$$P_{XC} - P_{XA} - F_{RA} - F_{RB} - F_{RC} = (m_A + m_B + m_C) a$$

$$68'14 - 53'52 - 2'6 - 1'47 - 2'12 = (7+3+10) \cdot a$$

$$8'43 = 20a$$

$$a = \frac{8'43}{20} = 0'42 \frac{m}{s^2}$$