

РЈЕШЕЊА ЗАДАТАКА ЗА ПРВИ РАЗРЕД

1.

a)

$$v = v_0 - gt; v_1 = 0 \Rightarrow t_H = \frac{v_0}{g}$$

$$s_1 = v_0 t - \frac{g}{2} t^2 \quad H = v_0 t_H - \frac{g}{2} t_H^2 = \frac{v_0^2}{2g}$$

$$v_2 = v_0 + gt$$

$$s_2 = v_0 t + \frac{g}{2} t^2$$

$$s_1 + s_2 = H \Rightarrow v_0 t - \frac{g}{2} t^2 + v_0 t + \frac{g}{2} t^2 = H \Rightarrow 2v_0 t = H, t = \frac{H}{2v_0} = \frac{1}{2v_0} \frac{v_0^2}{2g}$$

$$t = \frac{v_0}{4g} = 0,127[s]$$

$$\text{или } v_{rel} = v_1 + v_2 = 2v_0 \quad v_{rel} t = H \Rightarrow t = \frac{H}{v_0}$$

b)

$$s_1 = v_0 \frac{v_0}{4g} - \frac{g}{2} \frac{v_0^2}{16g^2} = \frac{7}{32} \frac{v_0^2}{g} = 0,557[m]$$

c)

$$v_1 = v_0 - g \frac{v_0}{4g} = \frac{3}{4} v_0 = 3,75[m/s]$$

$$v_2 = \frac{5}{4} v_0 = 6,25[m/s]$$

2.

$$m_1 a_1 = F_{tr}$$

$$m_2 a_2 = F - F_{tr}$$

Не проклизава $t < t_0 \Rightarrow a_1 = a_2 = a$; $(m_1 + m_2)a = F$; $F = At$

$$a = \frac{At}{m_1 + m_2}; F_{tr} = \frac{m_1 At}{m_1 + m_2} \leq (F_{tr})_{\max} = km_1 g$$

$$t = t_0: F_{tr} = km_1 g$$

$$\frac{m_1 A}{m_1 + m_2} t_0 = km_1 g \Rightarrow t_0 = \frac{m_1 + m_2}{A} kg$$

$$t > t_0: F_{tr} = km_1 g = \text{const.}$$

$$a_1 = \frac{F_{tr}}{m_1} = kg; a_2 = \frac{F - F_{tr}}{m_2} = \frac{At - km_1 g}{m_2}$$

$$t \leq t_0 \quad a_1 = a_2 = \frac{At}{m_1 + m_2}$$

$$t > t_0 \quad a_1 = kg$$

$$a_2 = \frac{At - km_1g}{m_2}; \quad a_2 > a_1$$

3.

$$v = v_0 - at; \quad a = \frac{F_{tr}}{m} = \frac{km_1g}{m} = kg$$

$$v = 0; \quad t = \frac{v_0}{a} = \frac{v_0}{kg} \Rightarrow v_0 = kgt$$

$$\frac{1}{2}mv_0^2 = F_{tr}s \quad [\text{ИЛИ } s = v_0t - \frac{1}{2}at^2 = kgt^2 - \frac{kg}{2}t^2 = \frac{kg}{2}t^2 \Rightarrow k = \frac{2s}{gt^2}]$$

$$\frac{1}{2}mv_0^2 = kmgs \Rightarrow k = \frac{2s}{gt^2} = 0,0195 \approx 0,02$$

$$P = \frac{A}{t_0} = \frac{F_{tr}s_0}{t_0} = F_{tr}v_0 = kmgkgt = \frac{2s}{gt^2}mg \frac{2s}{t} = \frac{4s^2}{t^3}m = 46[W]$$

4.

$$P_x = const.$$

$$mv_x = (M + m)v'$$

$$v' = \frac{m}{M + m}v_x$$

$$v' = \frac{m}{M + m} \frac{v}{2} \sqrt{3}; \quad (M = m \approx M)$$

$$v' = 1,55[m]$$

5.

$$n = kn_1 \quad n_1 = \frac{P_1V_1}{RT_1} \quad \text{број молова у једном захвату} \quad \begin{array}{l} P_1 = 10^5 Pa \\ V_1 = 4 \cdot 10^{-3} m^3 \\ T_1 = 270K \end{array}$$

$$n = \frac{PV}{RT} \quad \text{број молова у резервоару} \quad \begin{array}{l} P = 2 \cdot 10^5 Pa \\ V = 1,5 m^3 \\ T_1 = 318K \end{array}$$

$$k = \frac{n}{n_1} = \frac{PV}{P_1V_1} \frac{T_1}{T} = 636,7 \approx 637 \quad \text{пута}$$