2. $m_V = 5\,kg$ $T_V = 20\,^\circ C$ $T_z = 0\,^\circ C$ $m_{et} = 50\,g$ $|h_z| = 1370\,\frac{kJ}{mol}$

$m_L = 1\,kg$ $T_L = -10\,^\circ C$ $\boxed{T = ?}$ $M_{et} = 46\,g/mol$

zažigalna toplota $Q = \frac{m_{et}}{M_{et}} |h_z| = 1489\,kJ$ 2/8

energijska bilanca:

$$m_V c_{pv}(T - T_V) + m_L c_{pL}(T_z - T_L) + m_L q_t + m_L c_{pv}(T - T_z) = Q$$ 3/8

$$\Rightarrow T = \frac{Q + m_V c_{pv} T_V - m_L c_{pL}(T_z - T_L) - m_L q_t + m_L c_{pv} T_z}{(m_L + m_V) c_{pv}}$$

$T = 61{,}6\,^\circ C$ 3/8

4. adiabatna spr.: $\varkappa = \frac{c_p}{c_v}$, $c_p - c_v = \frac{R}{M}$

$\varkappa = 1{,}40$ 2/8 $c_p = 1006\,\frac{J}{kg\,K}$

$p^{1-\varkappa} T^{\varkappa} = konst$ za plin, ki ostane v jeklenki

$p_1^{1-\varkappa} T_1^{\varkappa} = p_2^{1-\varkappa} T_2^{\varkappa}$ 2/8

$T_2 = \left(\frac{p_1}{p_2}\right)^{\frac{1-\varkappa}{\varkappa}} T_1 = \left(\frac{p_2}{p_1}\right)^{1-\frac{1}{\varkappa}} T_1 = 0{,}347\,T_1$ (631)

ali $m \sim \frac{pV}{T}$ $m_2 \sim \frac{p_2}{T_2}$ $m_1 \sim \frac{p_1}{T_1}$ $\left|\frac{m_2}{m_1} = \frac{p_2}{p_1}\frac{T_1}{T_2}\right.$ $= 185\,K$ 2/8

delež: $p_1 V_1^{\varkappa} = p_2 V_2^{\varkappa}$

delež $= \frac{V_1}{V_2} = \left(\frac{p_2}{p_1}\right)^{1/\varkappa} = 0{,}32$ 3/8

po dolgem času ($V = konst$) 2/8

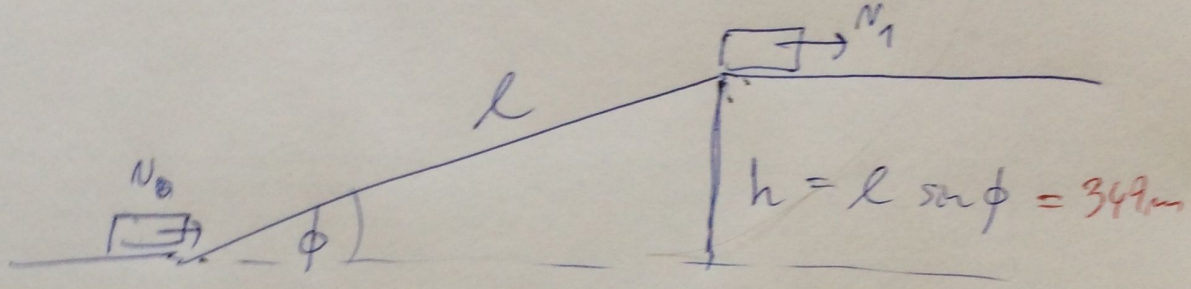
$\frac{p_2}{T_2} = \frac{p_3}{T_1}$ $p_3 = \frac{T_1}{T_2} p_2 = 31.6\,bar$

1. $m = 1{,}4 \cdot 10^3\ kg$ $\qquad F = 500\ N$

$v_0 = 100\ km/h = 27{,}8\ m/s$

$l = 10\ km$

$\phi = 2°$



energijski zakon : $\Delta W = A$

1) $\Delta W = \Delta W_p + \Delta W_k$ 1/8, $\Delta W_p = mgh$

$A = F \cdot l$ 1/8 $\qquad \Delta W_k = \frac{1}{2}mv_1^2 - \frac{1}{2}mv_0^2$ 1/8

$$\frac{m}{2}(v_1^2 - v_0^2) + mgh = Fl$$

$$v_1^2 = v_0^2 + \frac{2Fl}{m} - 2gl\sin\phi$$

$$v_1 = \sqrt{v_0^2 + 2\left(\frac{F}{m} - g\sin\phi\right)l}$$

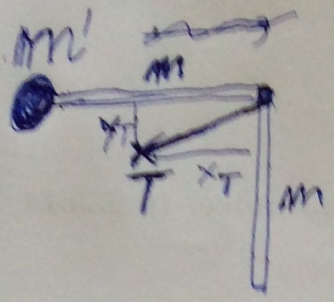
$$= 32{,}7\ m/s = 118\ km/h \quad 3/8$$

2) $$v_0^2 = v_1^2 - 2\left(\frac{F}{m} - g\sin\phi\right)l$$

$$v_0 = \sqrt{v_1^2 - 2\left(\frac{F}{m} - g\sin\phi\right)l}$$

$$= 18{,}2\ m/s = 65{,}3\ km/h \quad 2/8$$

3.



$m' = 1\,kg$

$m = 2\,kg$

$l = 1\,m$

T = těžiště

$$x_T = \frac{m'l + m\frac{l}{2} + m\cdot 0}{m' + 2m} = 0{,}4\,m$$

$$y_T = \frac{m\frac{l}{2}}{m' + 2m} = 0{,}2\,m$$

$$r_T = \sqrt{x_T^2 + y_T^2} = 0{,}447\,m$$

1) kolmý pospešek α

$M = J\alpha$ ← momentová věta

$M = (m' + 2m)\,g\,x_T$

$M = 19{,}62\,Nm$

$J = m'l^2 + 2\cdot\frac{ml^2}{3}$

$= l^2\left(m' + \frac{2m}{3}\right)$

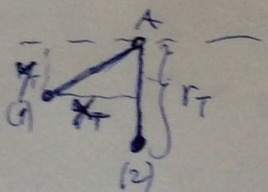
$= 2{,}33\,kgm^2$ 3/8

$$\Rightarrow \boxed{\alpha = \frac{M}{J} = 8{,}41\,s^{-2}}$$

2) $\Delta W_k + \Delta W_p = 0$

$\Delta W_k = \frac{1}{2}J\omega^2$

$\Delta W_p = -(m' + 2m)\,g\,(r_T - y_T)$



$r_T - y_T = 0{,}247\,m$

$\frac{1}{2}J\omega^2 = (m' + 2m)\,g\,(r_T - y_T)$ 5/8

$$\omega = \sqrt{\frac{2(m' + 2m)\,g\,(r_T - y_T)}{J}} = 3{,}22\,s^{-1}$$