

**JAVÍTÓKULCS****I. feladat**

a)  $L = mg \frac{h}{2}; L = 400 \text{ kg} \cdot 9,8 \frac{\text{N}}{\text{kg}} \cdot \frac{4 \text{ m}}{2} = 7840 \text{ J}$

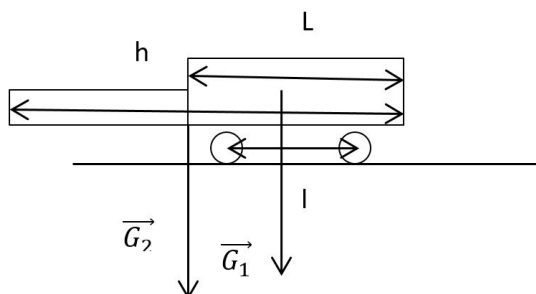
2 p

b)

$$G_1 \cdot \frac{l}{2} = G_2 \cdot \left[ \frac{h}{2} - \left( \frac{l}{2} + \frac{L}{2} \right) \right]$$

2 p

$$m = \frac{M \cdot l}{h - (l + L)}; m_{\max} = 2,4 \text{ t}$$



c)

$$L_{\text{hasznos}} = mgh + (h \cdot a \cdot g) \cdot \frac{h}{2}; L_{\text{hasznos}} = 917,28 \text{ J}$$

2 p

$$\frac{L_{\text{hasznos}}}{L_{\text{befektetett}}} \cdot 100\%; L_{\text{befektetett}} = \frac{L_{\text{hasznos}}}{\eta} \cdot 100\% = 1146,60 \text{ J}$$

d)  $D = 3470 \text{ mérföld} = 6426,44 \text{ km}$

2 p

$$v = 2,1 \cdot 1234,8 \text{ km/h} = 2593,08 \text{ km/h}$$

$$t = 2 \text{ h } 28 \text{ min } 42 \text{ s} - \text{repülési idő}$$

$$t_{\text{London}} = 12 \text{ h } 28 \text{ min } 42 \text{ s}$$

$$t_{\text{New York}} = 7 \text{ h } 28 \text{ min } 42 \text{ s}$$

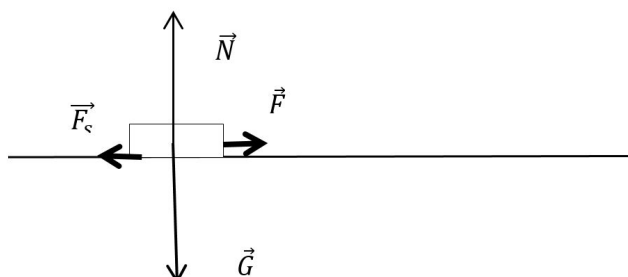
e)  $\frac{k \cdot (\Delta l)^2}{2} = mgh; h = \frac{k \cdot (\Delta l)^2}{2mg}; h = 5 \text{ m}$

2 p

**II. feladat**

a)

1 p



b)  $\Delta E_m = E_m - E_{mo} = L$  0,5 p

$$E_{mo} = 0 \text{ J}; \quad E_m = \frac{M \cdot v^2}{2} = 60000 \text{ J} = 60 \text{ kJ}; \quad F_s = \frac{Mg}{10} = 4800 \text{ N} = 4,8 \text{ kN}$$

$$L = (F_{gyorsulás} - F_s) \cdot d; E_m = F \cdot d; F = \frac{E_m}{d} = 200 \text{ N}$$

$$F = F_{gyorsulás} - F_s; F_{gyorsulás} = 5 \text{ kN} \quad 1 \text{ p}$$

c)  $F_s = \frac{mg}{10}$

$$F_s = 4800 \text{ N} = 4,8 \text{ kN}$$

$$\vec{F} = -\vec{F}_s$$

$$F = F_s = 4,8 \text{ kN} \quad 1 \text{ p}$$

d)  $P = Fv$

$$P = 240000 \text{ N} = 24 \text{ kW} \quad 1 \text{ p}$$

e)  $\Delta E_m = E_m - E_{mo} = L$  0,5 p

$$E_m = 0 \text{ J}; E_{mo} = 60 \text{ kJ}$$

$$L = -(F_{lassulás} - F_s) \cdot d; -E_{mo} = -F \cdot d$$

$$-F = F_{lassulás} - F_s; F_{lassulás} = 4,6 \text{ kN} \quad 1 \text{ p}$$

f)  $d = d_1 = d_2 = d_3 = \frac{D}{3}; d = 300 \text{ m}$

1. szakasz és 3. szakasz:

$$v_k = \frac{0 + v}{2}; v_k = 2,5 \frac{\text{m}}{\text{s}} \quad 1 \text{ p}$$

$$d = v_k \cdot t_{1,3}; t_{1,3} = \frac{d}{v_k}; t_{1,3} = 120 \text{ s} \quad 1 \text{ p}$$

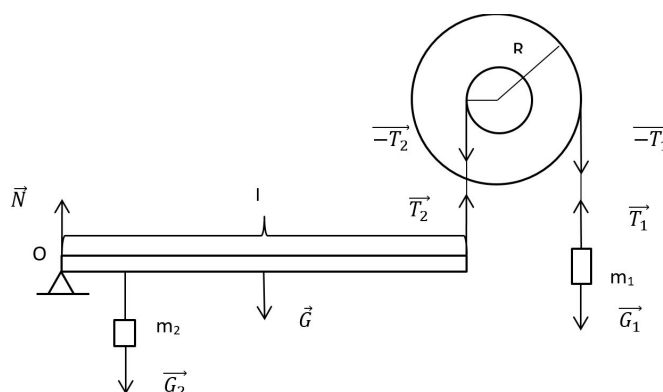
2. szakasz:

$$d = v \cdot t_2; t_2 = \frac{d}{v}; t_2 = 60 \text{ s} \quad 1 \text{ p}$$

$$t = 2 \cdot t_{1,2} + t_2; t = 300 \text{ s} = 5 \text{ min} \quad 1 \text{ p}$$

### III. feladat

a) Erők ábrázolása 2 p



$$\text{b) } \left\{ \begin{array}{l} T_2 \cdot l = M \cdot g \frac{l}{2} + m_2 \cdot g \cdot x \\ T_2 \cdot r = T_1 \cdot R \\ T_1 = m_1 \cdot g \end{array} \right\} \quad 4 \text{ p}$$

$$m_1 \cdot g \cdot n \cdot l = \frac{M \cdot g \cdot l}{2} + m_2 \cdot g \cdot x \quad x = 0,6 \text{ m} \quad 4 \text{ p}$$