

4. vizsga megoldásai

1.)
$$\langle v \rangle = \frac{\text{Számtartomány}}{\text{Időtartomány}} = \frac{\frac{1}{2} \cdot 6 \frac{\text{m}}{\text{s}} \cdot 2\text{s} + 6 \frac{\text{m}}{\text{s}} \cdot 2\text{s} + \frac{1}{2} \cdot 6 \frac{\text{m}}{\text{s}} \cdot 1\text{s} + \frac{1}{2} \cdot 6 \frac{\text{m}}{\text{s}} \cdot 1\text{s} + \frac{1}{2} \cdot 6 \frac{\text{m}}{\text{s}} \cdot 2\text{s}}{8\text{s}}$$

$$\langle v \rangle = \underline{3,75 \frac{\text{m}}{\text{s}}} \quad \text{(D)}$$

2.) $v_0 = \sqrt{2gh}$ emelkedés ideje: $t = \frac{v_0 \sin \alpha}{g}$,



hajítás távolsága: $s = v_0 \cos \alpha \cdot 2t = \frac{2 v_0^2 \sin \alpha \cos \alpha}{g}$

$$s = \frac{v_0^2}{g} \sin 2\alpha = \underline{2h} \quad \text{(B)}$$

3.) A fordulatszám az idő függvényében:

$$f = \frac{\omega}{2\pi} = \frac{1}{2\pi} \beta t$$

A rögzített fordulás:

$$\Delta\varphi = \frac{1}{2} \beta t^2 = 2\pi \rightarrow t = \sqrt{\frac{4\pi}{\beta}}$$

$$f = \frac{1}{2\pi} \beta \sqrt{\frac{4\pi}{\beta}} = \sqrt{\frac{\beta}{\pi}} \rightarrow \beta = \pi f^2 = \underline{0,35 \frac{1}{\text{s}^2}}$$

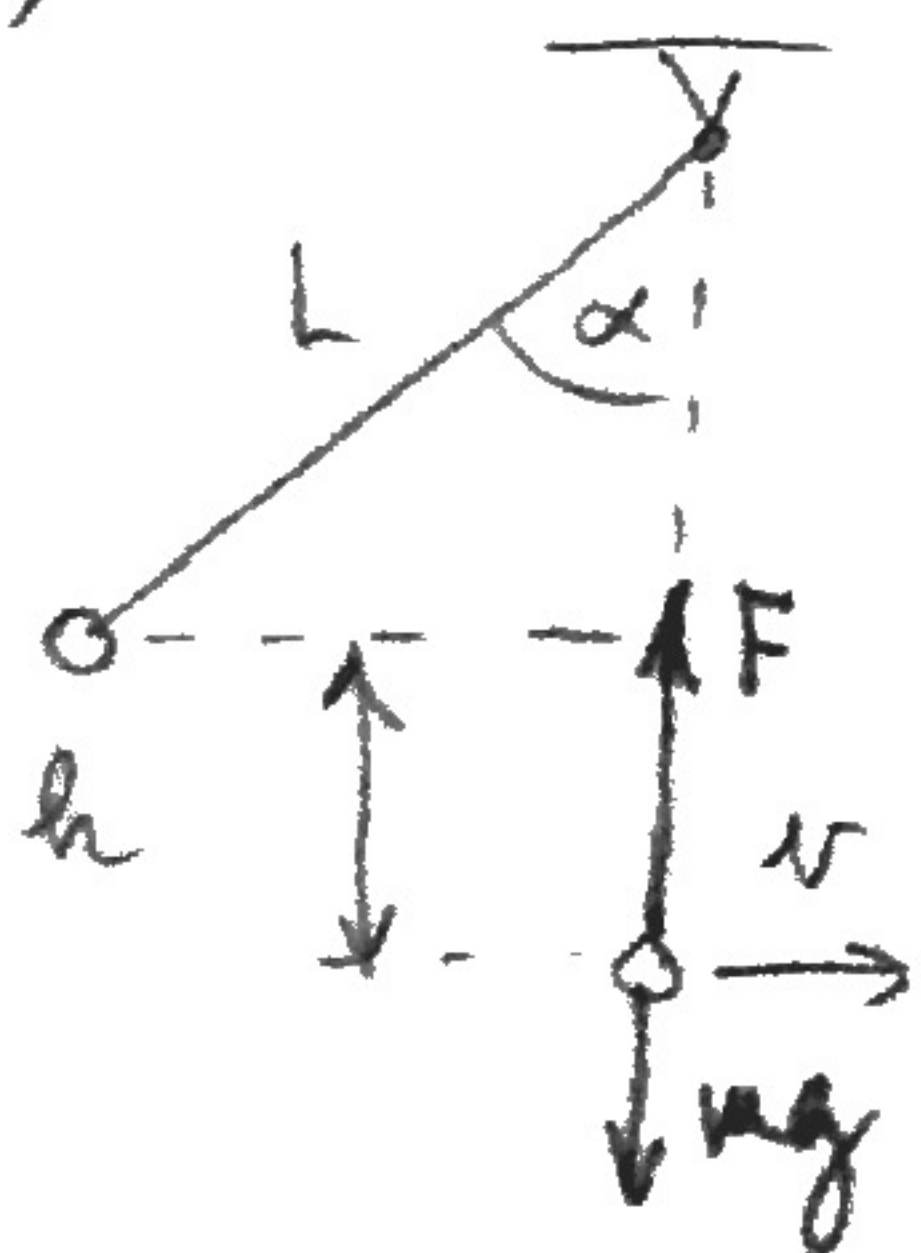
(B)

4.) A súrlódási erő: $F_{\pm} = mg(\mu \cos \alpha \pm \sin \alpha)$

(A)

A munkavégzések aránya: $\frac{W_+}{W_-} = 2 = \frac{\mu \cos \alpha + \sin \alpha}{\mu \cos \alpha - \sin \alpha}$, ebből: $\mu = 3 \tan \alpha = \underline{0,80}$

5.)



$$v = \sqrt{2gh} = \sqrt{2gL(1 - \cos \alpha)}$$

Dinamika alapegyenlete:

$$F - mg = m \frac{v^2}{L} \rightarrow F = mg + 2mg(1 - \cos \alpha) = 2mg$$

$$\underline{F = 4,0 \text{ N}}$$

(B)

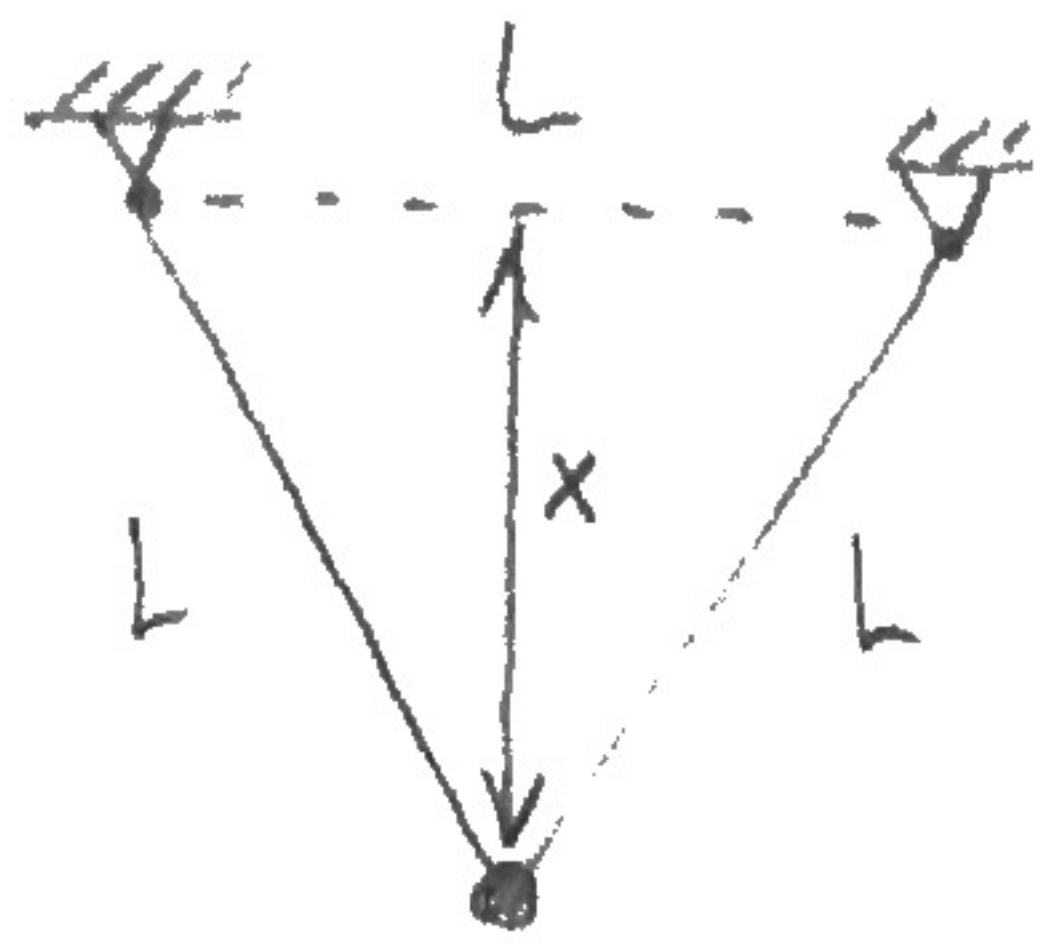
6.) Impulzusmegmaradás: $m_1 \underline{v}_1 + m_2 \underline{v}_2 = (m_1 + m_2) \underline{v}$,

ebből.

$$\underline{v} = \frac{5\underline{i} - 2\underline{j} + 2(-4\underline{i} + 3\underline{j})}{3} = -\underline{i} + \frac{4}{3}\underline{j}$$

$$|\underline{v}| = \sqrt{(-1)^2 + \left(\frac{4}{3}\right)^2} = \frac{5}{3} = \underline{1,67 \frac{m}{s}} \quad \textcircled{B}$$

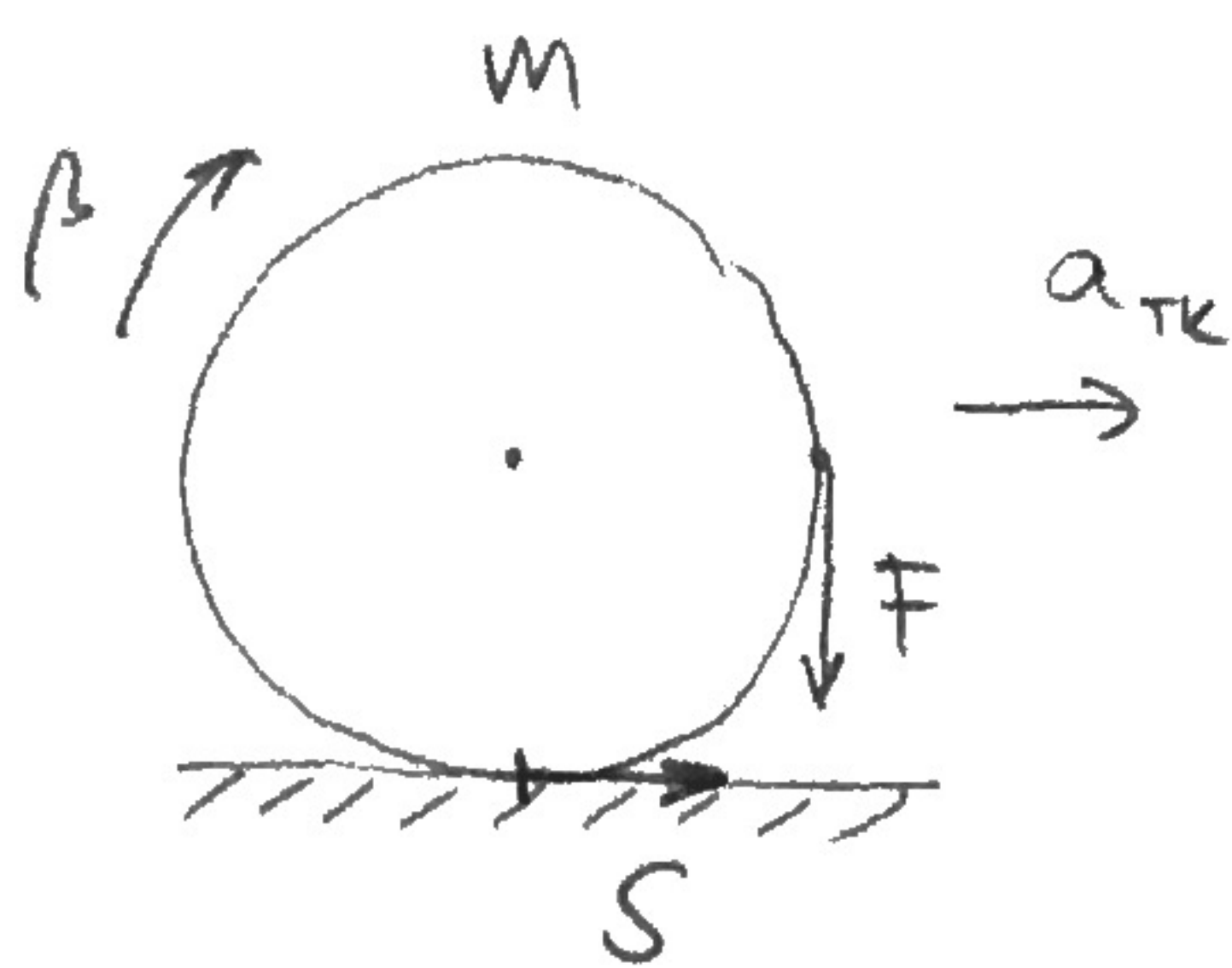
7.)



A rendszer $x = L \sin 60^\circ = \frac{\sqrt{3}}{2} L$ hosszúságú fonálinga-
ként viselkedik:

$$T = 2\pi \sqrt{\frac{x}{g}} = 2\pi \sqrt{\frac{\frac{\sqrt{3}}{2} L}{g}} = \underline{1,31 \text{ s}} \quad \textcircled{B}$$

8.)



Mozgás- és forgásegyenlet.

$$S = m a_{TK}$$

$$FR - SR = \frac{1}{2} m R^2 \beta$$

$$a_{TK} = R\beta$$

$$F = \frac{3}{2} m a_{TK}$$

$$\underline{a_{TK} = \frac{2F}{3m}} \quad \textcircled{A}$$

9.)

$$\frac{\Delta Q}{\Delta t} = k_1 \frac{A}{L} (T_1 - T)$$

$$\frac{\Delta Q}{\Delta t} = k_2 \frac{A}{L} (T - T_2)$$

$$\frac{\Delta Q}{\Delta t} \left(\frac{L}{k_1 A} + \frac{L}{k_2 A} \right) = T_1 - T_2$$

↓

$$\frac{\Delta Q}{\Delta t} = \frac{T_1 - T_2}{\frac{1}{k_1} + \frac{1}{k_2}} \cdot \frac{A}{L} = \underline{150 \text{ W}} \quad \textcircled{A}$$