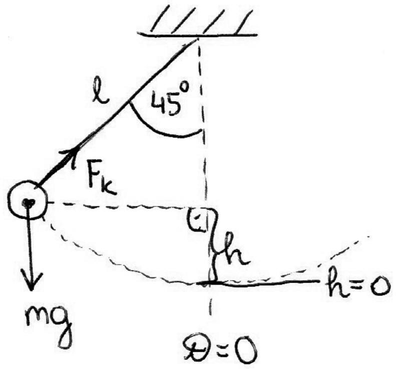
18.) $\vartheta_0 = 45°$ $a_{min} = ?$ $\vartheta = ?$

$\boxed{a = \sqrt{a_t^2 + a_n^2}}$ $\boxed{a_n = \frac{v^2}{l}}$

$\boxed{E_M = E_p + E_k}$ $\boxed{E_p = mgh}$ $\boxed{E_k = \frac{1}{2}mv^2}$



$a_t = g\sin\vartheta \rightarrow a_t^2 = g^2 \sin^2\vartheta$

$a_n^2 = \frac{v^4}{l^2}$ $h = l - l\cos\vartheta = l(1-\cos\vartheta)$

$E_M = \text{áll}$

$mgh_0 = mgh + \frac{1}{2}mv^2 \longrightarrow v^2 = 2g(h_0 - h) = 2g(l - l\cos\vartheta_0 - l + l\cos\vartheta)$

$v^2 = 2gl(\cos\vartheta - \cos\vartheta_0)$

$a_n = \frac{v^2}{l} = 2g(\cos\vartheta - \cos\vartheta_0)$

$a^2 = a_t^2 + a_n^2 = g^2\sin^2\vartheta + 4g^2(\cos\vartheta - \cos\vartheta_0)^2 = \ldots$

$a^2 = 3g^2\cos^2\vartheta - 8g^2\cos\vartheta_0\cos\vartheta + g^2 + 4g^2\cos^2\vartheta_0$

Minimális ϑ-nál, ha $\frac{da^2}{d\vartheta} = 0$

$\frac{da^2}{d\vartheta} = 3g^2 \cdot 2\cos\vartheta(-\sin\vartheta) - 8g^2\cos\vartheta_0(-\sin\vartheta) = 0$

ϑ_1: $\sin\vartheta_1 = 0$

$\vartheta_1 = 0$

ϑ_2: $6g^2\cos\vartheta_2 - 8g^2\cos\vartheta_0 = 0$

$\cos\vartheta_2 = \frac{4}{3}\cos\vartheta_0$

egyik minimum, másik maximum

Behelyettesítve eldönteni...