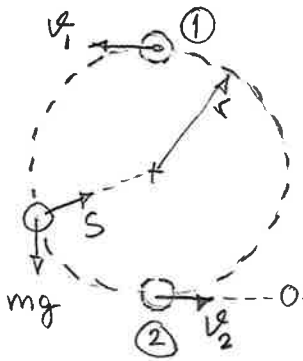
1)



v_2 fås ur energisatsen

Läge ① → ②, $v_1 = 3{,}13\,m/s$

$S \perp ds \Rightarrow W_S = 0$

dvs endast $V_g \leq T$

① : $V_{g1} = mg2r$, $T_1 = \frac{1}{2}mv_1^2$

② : $V_{g2} = 0$, $T_2 = \frac{1}{2}mv_2^2$

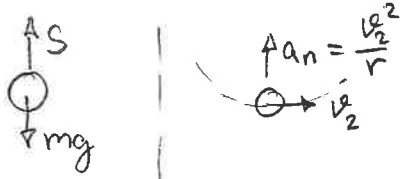
$E_1 = E_2 \Rightarrow$

$mg2r + \frac{1}{2}mv_1^2 = \frac{1}{2}mv_2^2$;

$v_2^2 = v_1^2 + 4gr$; $v_2 = \sqrt{3.13^2 + 4 \cdot 9.81 \cdot 1} =$

$= 7.00\,m/s$

Kraften S:

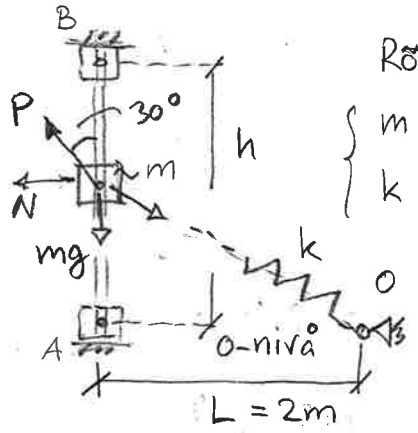


NII: (↑) $S - mg = m\frac{v_2^2}{r}$; $S = m\left(g + \frac{v_2^2}{r}\right)$;

$S = m\left(9.81 + \frac{7^2}{1}\right) = 0.05 \cdot 58.8 = \underline{2.9\,N} \approx 6mg$

omf statiskt $S = mg$

2)



Rörelse A → B

$m = 2\,kg$ $P = 50\,N$, $h = 1.5\,m$

$k = 30\,N/m$ $l = 1.5\,m$ (ospänd)

$N \perp ds \Rightarrow W_N = 0$

$l_{OB} = \sqrt{L^2 + h^2} = 2.5\,m$

Energi ekv. $W^{(ik)} = E_B - E_A \; (= \Delta E)$ ... (*)

A: $T_A = 0$, $V_{gA} = 0$, $V_{eA} = \frac{1}{2}k(L-l)^2 = 3.75\,J$

B: $T_B = \frac{1}{2}mv_B^2$, $V_{gB} = mgh = 29.43\,J$, $V_{eB} = \frac{1}{2}k(l_{OB}-l)^2 = 15\,J$

$W^{(ik)} = P\cos 30° \cdot h = 50 \cdot 0.866 \cdot 1.5 = 64.95\,J$

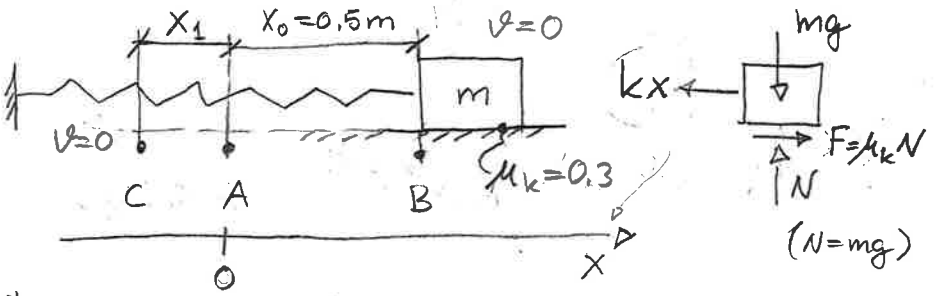
Alltså enl. (*):

$64.95 = \frac{1}{2}mv_B^2 + \underbrace{29.43 + 15 - 3.75}_{40.68}$;

$\frac{1}{2} \cdot 2 \cdot v_B^2 = 64.95 - 40.68$;

$v_B^2 = 24.27$; $v_B = \underline{4.9\,m/s}$

3) Massan släpps från vila i B



Beräkna max hoptryckning x_1 (då $v=0$) i C och hastighet i A.

Energisatsen: $W^{(ik)} = \Delta E$, $E = T + V_e$

B → A: $-F \cdot x_0 = \frac{1}{2} m v_A^2 - \frac{1}{2} k x_0^2 \; (= E_A - E_B)$;

$\frac{1}{2} m v_A^2 = \frac{1}{2} k x_0^2 - \mu_k m g x_0$;

$v_A^2 = \frac{k}{m} x_0^2 - 2 \mu_k g x_0 =$

$= \frac{300}{10} \cdot 0.5^2 - 2 \cdot 0.3 \cdot 9.81 \cdot 0.5 = 4.56$;

$v_A = \sqrt{4.56} = \underline{2.13 \text{ m/s}}$

A → C: $-F \cdot x_1 = \frac{1}{2} k x_1^2 - \frac{1}{2} m v_A^2 \; (= E_C - E_A)$;

$\frac{1}{2} k x_1^2 + \mu_k m g x_1 - \frac{1}{2} m v_A^2 = 0$;

$150 x_1^2 + 29.4 x_1 - 22.7 = 0$; 2:a grads ekv. ⇨

... $x_1 = 0.3 \text{ m}$