TBM 7B, 26.10.2016

(1) seriell: $k_{tot}^{-1} = k_1^{-1} + k_2^{-1}$

$$\frac{1}{k_{tot}} = \frac{1}{k_1} + \frac{1}{k_2}$$

$$\Rightarrow \frac{1}{k_{tot}} > \frac{1}{k_2} \quad / \,{}^{1}/_{x}$$

$$k_{tot} < k_2$$

Bsp.: $k_1 = 1\ N/m$, $k_2 = 2\ N/m$

$$k_{tot} = \frac{1}{\frac{1}{1} + \frac{1}{2}} = \frac{1}{\frac{3}{2}} = \frac{2}{3}\ N/m$$

↪ Antwort c)

(2) $k = 625\ N/m$

$m = 1kg \Rightarrow F = mg = 10N$

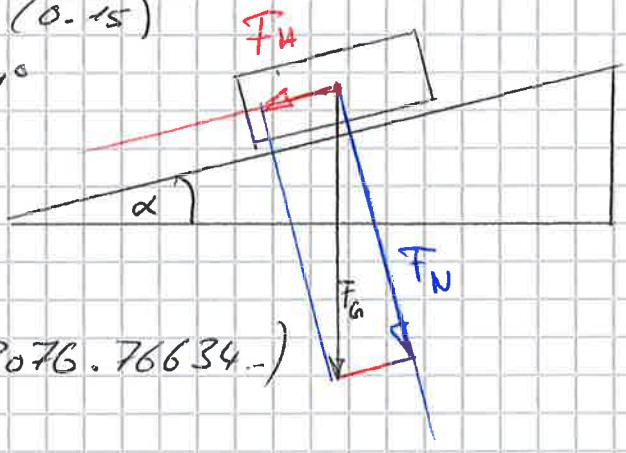
$F = k \cdot x$

$$x = \frac{F}{k} = \frac{10N}{625\ N/m} = \frac{2}{125}\ N/m$$

$$= 0.016m = 16mm$$

(3) $m = 15\% \Rightarrow \alpha = \arctan(0.15)$

$\cong 8.531°$



$F_H = F_G \cdot \sin\alpha$

$= 1400 \cdot 10 \cdot \sin\alpha$

$\cong 2'076.77\,N$ (2076.76634..)

$F_N = F_G \cdot \cos\alpha$

$F_{Reib} = \mu \cdot F_N = \mu \cdot m \cdot g \cdot \cos\alpha \cong 692.26\,N$

(692.255447)

c)

$F_{tot} = F_H + F_{Reib}$

$P = F \cdot v$: $F_{tot} \cdot v = 160\,kW = P$

$v = \frac{P}{F_{tot}} = 36.1138365\ m/s$

$\cong 36.1\ m/s$

$\cong 130\ km/h$

(4) $x_1 = 4cm = 0.04m$

$x_2 = 6cm = 0.06m$

Fallzeit: $\frac{1}{2} g t^2 = h$

$t = \sqrt{\frac{2h}{g}} = \sqrt{0.25} = 0.5s$

$20m$ in $0.5s \Rightarrow v = 40\ m/s$

$E_{kin} = E_{Feder}$

$\frac{1}{2} m v^2 = \frac{1}{2} k (x_2^2 - x_1^2)$

$\frac{m v^2}{x_2^2 - x_1^2} = k = \frac{0.001 \cdot 40^2}{0.06^2 - 0.04^2} = \underline{\underline{800\ N/m}}$