

AP 2002 - AI

1.0 Geg: $m = 1,2 \cdot 10^3 \text{ kg}$; $(\alpha = 12^\circ)$; $\mu = 0$ ^{Später}

1.1 Geg: $t_A = 0 \text{ s}$; $v_A = 12 \frac{\text{m}}{\text{s}}$; $s_{AB} = 64 \text{ m}$; $v_B = 20 \frac{\text{m}}{\text{s}}$

Ges: a ; t_B

$v_B^2 - v_A^2 = 2as_{AB} \Leftrightarrow a = \frac{v_B^2 - v_A^2}{2s_{AB}}$

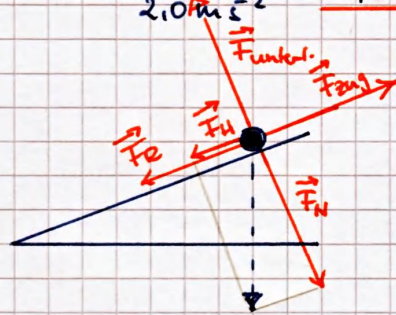
$a = \frac{(20 \text{ m s}^{-1})^2 - (12 \text{ m s}^{-1})^2}{2 \cdot 64 \text{ m}} = \underline{2,0 \text{ m s}^{-2}}$

$v_B = at_B + v_A \Leftrightarrow t_B = \frac{v_B - v_A}{a} = \frac{(20 - 12) \text{ m s}^{-1}}{2,0 \text{ m s}^{-2}} = \underline{4,0 \text{ s}}$

1.2.0 Geg: $\mu = 0,020$; $\alpha = 12^\circ$

1.2.1 Ges: Kräfteplan

$(\vec{F}_H + \vec{F}_R = -\vec{F}_{\text{Zug}})$



1.2.2 Ges: P

$P = \frac{\Delta W}{\Delta t} = \frac{F_{\text{Zug}} \cdot \Delta s}{\Delta t} = F_{\text{Zug}} \cdot v_B \quad (v_B = \frac{\Delta s}{\Delta t})$

$F_{\text{Zug}} = F_H + F_R = F_H + \mu F_N = mg \sin(\alpha) + \mu mg \cos(\alpha)$

$P = mg (\sin(\alpha) + \mu \cos(\alpha)) \cdot v_B$

$= 1,2 \cdot 10^3 \text{ kg} \cdot 9,81 \frac{\text{N}}{\text{kg}} (\sin(12^\circ) + 0,020 \cos(\alpha)) \cdot 20 \frac{\text{m}}{\text{s}}$

$= 53557 \frac{\text{Nm}}{\text{s}} = \underline{54 \text{ kW}}$

1.3 Geg: $\alpha = 0^\circ$; $v_0 = v_E = 20 \frac{\text{m}}{\text{s}}$; $v = 0$; $\mu_H = 0,55$

Ges: s_{Br}

$-2 \cdot a \cdot s_{Br} = v^2 - v_E^2 \Rightarrow s_{Br} = \frac{v_E^2}{2a}$

$(-) F_{Br} = (-) \mu F_N$

$\Rightarrow \ddot{m}a = \mu \ddot{m}g$

$\Rightarrow a = \mu g$

$s_{Br} = \frac{v_E^2}{2 \mu g} = \frac{(20 \text{ m s}^{-1})^2}{2 \cdot 0,55 \cdot 9,81 \text{ m s}^{-2}}$

$s_{Br} = \underline{37 \text{ m}}$

(oder $W_{\text{Reib}} = \Delta E_{\text{kin}} \Rightarrow F_R \cdot s_{Br} = \frac{1}{2} m v_E^2 \dots$)