

1.0 Geg: $m = 1200 \text{ kg}$; $r = 8,0 \text{ m}$; $a_{\text{Zoben}} = 1,6 g$

$\mu = 0$; $v_A = 0$ (startet aus Ruhe)

1.1.1 $a_z = \frac{v_c^2}{r} = 1,6 g \Leftrightarrow \underline{v_c = \sqrt{1,6 r g}}$

1.2.1 $E_{\text{ges}} = E_{\text{pot}}(C) + E_{\text{kin}}(C)$ (= konst, da $\mu = 0$)

$= m g h_c + \frac{1}{2} m v_c^2$

$= m g \cdot 2r + \frac{1}{2} m \cdot 1,6 r g = \underline{2,8 m g r}$

($E_{\text{ges}} = 2,8 \cdot 1,2 \cdot 10^3 \text{ kg} \cdot 9,81 \text{ m/s}^2 \cdot 8,0 \text{ m} = 264 \text{ kJ}$)

1.2.2 $E_{\text{ges}} = E_{\text{pot}}(h) + E_{\text{kin}}(h) \Leftrightarrow E_{\text{kin}}(h) = E_{\text{ges}} - E_{\text{pot}}(h)$

$\frac{1}{2} \tilde{m} v^2(h) = 2,8 \tilde{m} g r - \tilde{m} g h$

$\Leftrightarrow v(h) = \sqrt{5,6 g r - 2 g h} = \underline{\sqrt{g (5,6 r - 2 h)}}$

1.2.3 $F_{\text{Schiene}} = F_z = \frac{m v^2}{r}$; $h = r$; $v(r) = \sqrt{3,6 r g}$

$F_{\text{sch}} = \frac{m \cdot 3,6 r g}{r} = 3,6 m g = 3,6 F_g$

$= 3,6 \cdot 1200 \text{ kg} \cdot 9,81 \text{ N/kg} = \underline{42 \text{ kN}}$

1.2.4 $h = 0 \Rightarrow v(h=0) = \sqrt{5,6 g r} = \sqrt{5,6 \cdot 9,81 \text{ m/s}^2 \cdot 8,0 \text{ m}} = \underline{21 \frac{\text{m}}{\text{s}}}$

1.2.5 $E_{\text{pot}}(A) = E_{\text{ges}} = 2,8 m g r$ (vgl. 1.2.1)

$\tilde{m} g h_A = 2,8 \tilde{m} g r \Rightarrow \underline{h_A = 2,8 r}$ (= $22,4 \text{ m} = 22 \text{ m}$)

1.3.0 $a_{\text{max}} = 1,33 g$

1.3.1 $F_{\text{max}} = m \cdot a_{\text{max}} = 1200 \text{ kg} \cdot 1,33 \cdot 9,81 \text{ m/s}^2 = 15,7 \text{ kN} = \underline{16 \text{ kN}}$

1.3.2 $v = at + v_0 \Leftrightarrow t_{\text{Br}} = -\frac{v_0}{a} = \frac{21 \text{ m/s}}{-1,33 \cdot 9,81 \text{ m/s}^2} = \underline{1,6 \text{ s}}$

1.3.3

