AP 2010 Physik II

2.1 (4)

$a = \frac{\Delta v}{\Delta t} = \frac{v_1}{t_1} = \frac{10\ m/s}{4{,}0\ s} = 2{,}5\ \frac{m}{s^2}$

$s = s_1 + s_2 = \frac{1}{2} a t_1^2 + v_1 \Delta t = \frac{1}{2} \cdot 2{,}5\ \frac{m}{s^2} \cdot (4{,}0\ s)^2 + 10\ \frac{m}{s} \cdot 3{,}0\ s$

$= 20\ m + 30\ m = \underline{50\ m}$

2.2 (4)

$F_{aug} = F_a + F_w = ma + 0{,}18 \cdot mg = \underline{1{,}1\ kN}$

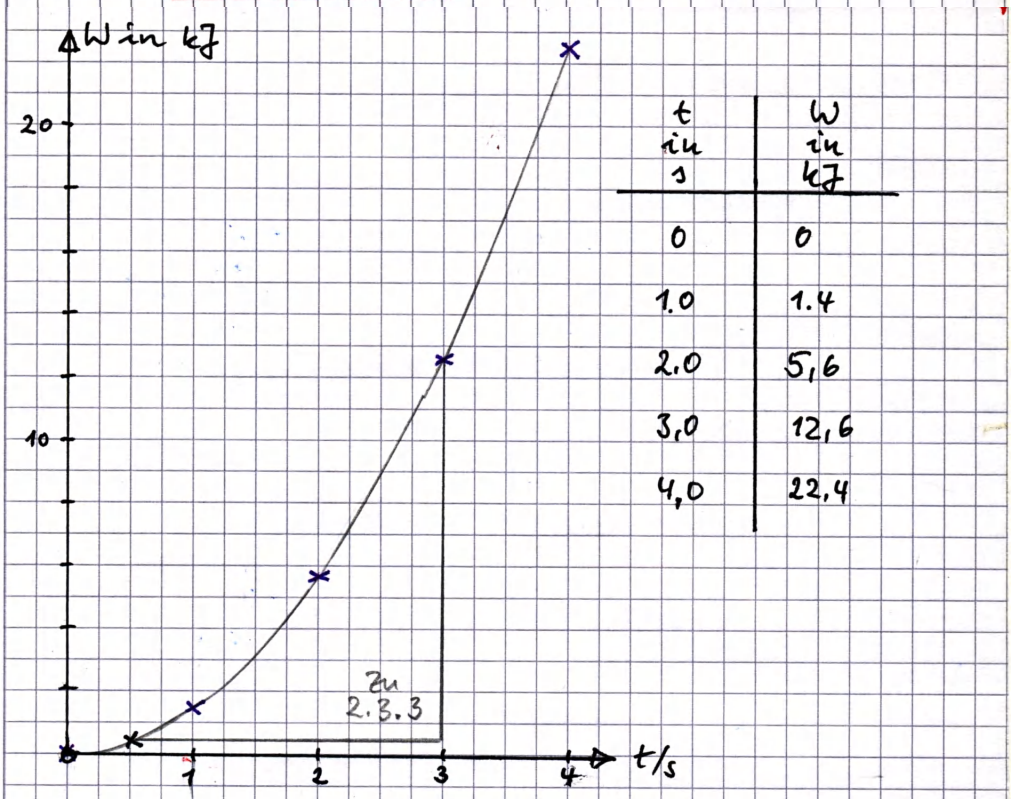
$= 260\ kg \cdot 2{,}5\ \frac{m}{s^2} + 0{,}18 \cdot 260\ kg \cdot 9{,}81\ \frac{N}{kg} = 650\ N + 459\ N =$ (1109 N)

2.3.1 (4)

$W(t) = F_z \cdot s(t) = F_z \cdot \frac{1}{2} a t^2 = 1{,}1\ kN \cdot \frac{1}{2} \cdot 10\ \frac{m}{s^2} \cdot t^2$

$= \underline{1{,}4 \cdot 10^3\ \frac{J}{s^2} \cdot t^2}$ (1,375...)

2.3.2 (4)



t in s	W in kJ
0	0
1.0	1.4
2.0	5,6
3,0	12,6
4,0	22,4

2.3.3 (4)

$\overline{P} = \frac{\Delta W}{\Delta t} = \frac{12{,}6\ kJ - 0{,}4\ kJ}{2{,}5\ s} = 4{,}88\ \frac{kJ}{s} = \underline{4{,}9\ kW}$

2.3.4 (3)

$P(t) = \dot{W}(t) = 2{,}8 \cdot 10^3\ \frac{J}{s^2} \cdot t \quad ; \quad P(3{,}0\ s) = 2{,}8 \cdot 10^3 \cdot 3\ W = \underline{8{,}4\ kW}$

2.4.1 (6)

(2) $\tan\beta = \frac{F_z}{F_G} = \frac{m v^2 / r}{mg} = \frac{v^2}{rg}$ (= 0,3185)

(2) $\beta = \tan^{-1}\left(\frac{v^2}{rg}\right) = \tan^{-1}\left(\frac{(10\ \frac{m}{s})^2}{32\ m \cdot 8{,}81\ \frac{m}{s^2}}\right) = \underline{18°}$ (17,67°)

2.4.2 (4)

$F_R = F_z \Rightarrow F_R = F_G \cdot \tan(\beta) \Leftrightarrow \mu mg = mg \tan(\beta)$

$\Rightarrow \mu = \tan(\beta) \Rightarrow \beta_{max} = \tan^{-1}(\mu) = \tan^{-1}(0{,}62) = \underline{32°}$