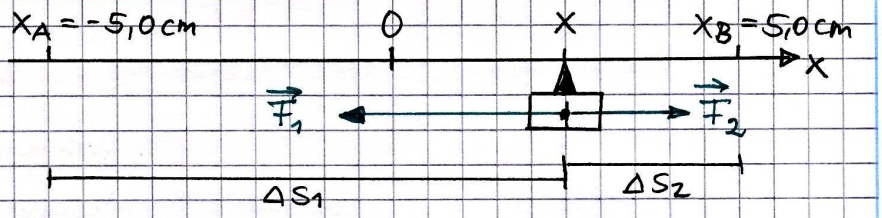
Name | Klasse | Datum | Seite / Blatt

AP 1999 – III

2.1



$$F_{Rü} = F_{RES} = -F_1 + F_2 = -D_F|\Delta s_1| + D_F|\Delta s_2|$$
$$= -D_F(x - x_A) + D_F(x_B - x)$$
$$= -D_F x + D_F x_A + D_F x_B - D_F x = -2D_F x$$
($x_A = -5{,}0\,cm$, $x_B = 5\,cm$)

$$F_{Rü} = -2D_F x$$

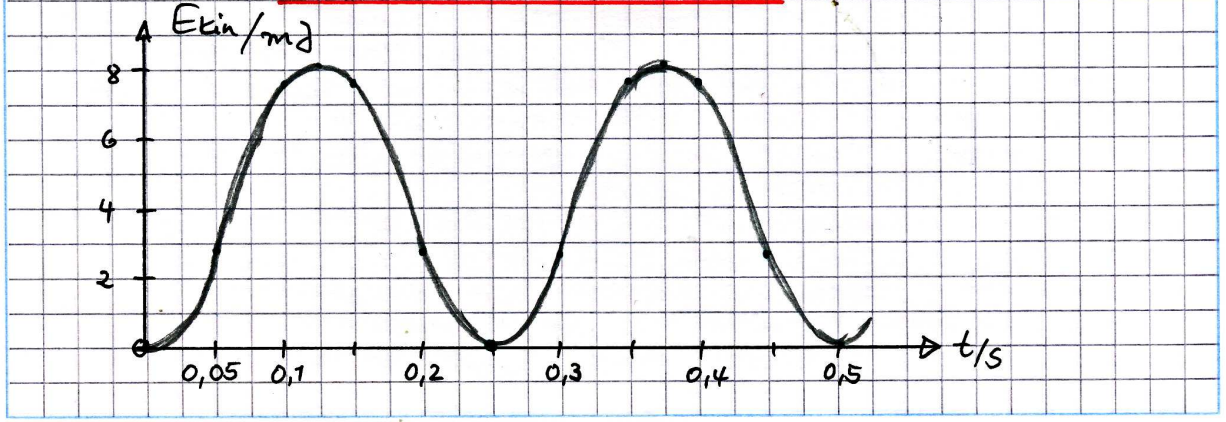
↳ Lineares Kraftgesetz ⇒ Harmon. Schwingung m. Richtgröße $D = 2D_F$

2.2 Man mißt mehrere Komplette Schwingungen und berechnet $T = \frac{t}{n}$

2.3 $D = 2D_F$; $2\pi\sqrt{\frac{m}{2D_F}} = T \Leftrightarrow \frac{m}{2D_F} = \frac{T^2}{4\pi^2} \Leftrightarrow D_F = \frac{4\pi^2 m}{2T^2}$

$$D_F = \frac{4\pi^2 \cdot 0{,}180\,kg}{2 \cdot (0{,}505\,s)^2} \Rightarrow D_F = 14\,\frac{kg}{s^2} = 14\,\frac{N}{m}$$

2.4 $x(t) = 2{,}4\,cm \cdot \cos\left(\frac{2\pi}{0{,}505\,s} \cdot t\right) = 2{,}4\,cm \cdot \cos\left(4{,}0\pi \cdot \frac{1}{s} \cdot t\right)$

2.5 $E_{kin,max} = \frac{1}{2} m v_{max}^2 = \frac{1}{2} m (A\omega)^2 = \frac{1}{2} m \cdot \left(A \cdot \frac{2\pi}{T}\right)^2 = 8{,}2\,mJ$

2.6 $E_{kin}(t) = \frac{1}{2} m (v(t))^2 = \frac{1}{2} m v_{max}^2 \cdot \sin^2\left(4{,}0\pi \cdot \frac{1}{s} \cdot t\right)$
$= 8{,}2\,mJ \cdot \sin^2\left(4\pi \cdot \frac{1}{s} \cdot t\right)$