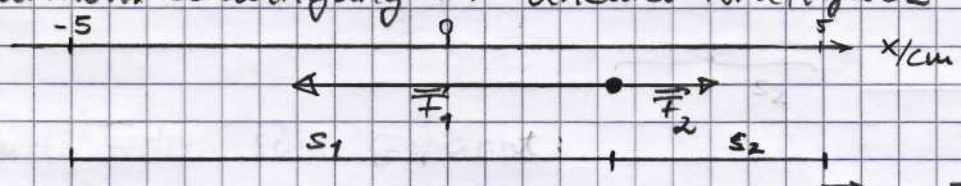
Name | Klasse | Datum | Seite / Blatt

AP 1999 – A III

2.1 Harmon. Schwingung $\Leftrightarrow$ lineares Kraftgesetz



$\vec{F}_{Ru} = \vec{F}_1 + \vec{F}_2$

$F_{Ru} = F_2 - F_1 = Ds_2 - Ds_1 \quad ; \; s_2 = |\vec{s}_2|$

$= D_F(5\,cm - x) - D_F(5\,cm + x)$

$F_{Ru} = -2D_F \cdot x = -Dx$ mit $D = 2D_F$

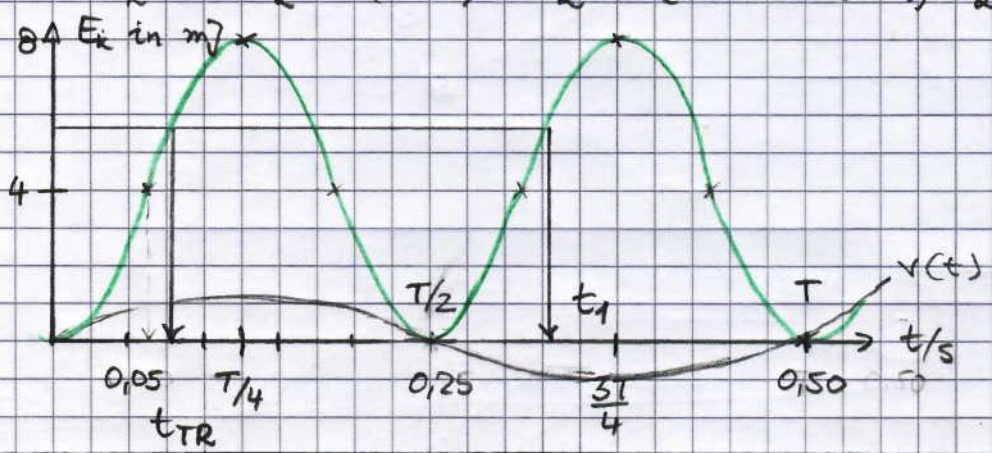
2.2 Auslenken, Loslassen, mehrere Schwingungen messen (3BE ??)

2.3 $T = 2\pi\sqrt{\frac{m}{D}} \Leftrightarrow D = 4\pi^2 \cdot \frac{m}{T^2}$ also $D_F = 2\pi^2 \cdot \frac{m}{T^2} = 14\,\frac{N}{m}$

2.4 $x(t) = 2.4\,cm \cdot \cos\left(\frac{2\pi}{0{,}50\,s}\,t\right) = 2{,}4\,cm \cdot \cos\left(4\pi \cdot \frac{1}{s} \cdot t\right)$

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

2.6 $E_k(t) = \frac{1}{2} m (v(t))^2 = \frac{1}{2} m (-A\omega \sin(\omega t)) = \frac{1}{2} m A^2 \omega^2 \sin^2(\omega t)$



2.7 $E_{pot}(t) + E_{kin}(t) = E_{ges}$ und $E_k = 2E_p \Leftrightarrow E_p = \frac{1}{2} E_k$

$\frac{3}{2} E_k(t) = E_{k\,max} \Leftrightarrow E_k(t) = \frac{2}{3} E_{k\,max}$

$E_{k\,max} \cdot \sin^2(\omega t) = \frac{2}{3} E_{k\,max}$ $\qquad t_1 = \frac{T}{2} + t_{TR}$

$\sin(\omega t) = \pm\sqrt{\frac{2}{3}} \Rightarrow t_{TR} = \frac{\sin^{-1}\left(\sqrt{\frac{2}{3}}\right)}{\omega} = 0{,}076\,s$