

Arbeitsblatt 2.1) 8-14)

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8) $f_1 = 200 \text{ Hz}$ $f_2 = 1500 \text{ Hz}$ $T_1 = \frac{1}{f_1}$ $T_2 = \frac{1}{f_2}$

$T_1 = \frac{1}{200 \text{ Hz}} \text{ s}$ $T_2 = \frac{1}{1500 \text{ Hz}} = \frac{1}{1500} \text{ s}$

~~$f_1 = 200 \text{ Hz}$~~

Schallgeschwindigkeit in der Luft:

$v_s = 343,2 \text{ m/s}$ laut Google

$v_s = \lambda \cdot f$

$\lambda = \frac{v_s}{f}$

$\lambda_1 = \frac{343,2 \text{ m/s}}{200 \text{ Hz}} = 1,716 \approx 1,72 \text{ m}$

$\lambda_2 = \frac{343,2 \text{ m/s}}{1500 \text{ Hz}} = 0,2288 \approx 0,23 \text{ m}$

$T = 30 \text{ min} = 1800 \text{ s}$

9) $v = 750 \text{ km/h}$ $v = \frac{750 \text{ km/h}}{3,6} = 208,33 \text{ m/s}$

$c = \frac{\lambda}{T}$

$\lambda = c \cdot T \Rightarrow 208,33 \text{ m/s} \cdot 1800 \text{ s} = 374994 \text{ m}$

10) $f = 99,9 \text{ kHz} = 99,9 \cdot 10^3 \text{ Hz}$

$v_s = 1 \cdot f \cdot \lambda$ $v_s = 299792458 \text{ m/s}$

$\lambda = \frac{v_s}{f} = \frac{299792458 \text{ m/s}}{99,9 \cdot 10^3 \text{ Hz}} = 3000,9 \text{ m}$

11) $v = 5 \text{ km/h} = 5 \text{ km/h} : 3,6 = 1,388 \text{ m/s}$

$\lambda = \frac{5000 \text{ m}}{8400} = 0,595 \text{ m} \approx 0,6 \text{ m}$ $f = \frac{8400}{3600 \text{ s}} = 2,33 \text{ Hz}$

12) a) $v = 750 \text{ km/h} = \frac{750 \text{ km/h}}{3,6} = 208,33 \text{ m/s}$ $\lambda = 200 \text{ km} = 200 \cdot 10^3 \text{ m}$

$208,33 \text{ m/s} = \frac{200 \cdot 10^3 \text{ m}}{T} \Rightarrow T = \frac{200 \cdot 10^3 \text{ m}}{208,33 \text{ m/s}} = 960,02 \text{ s}$

b) $v = 750 / 3,6 = 208,33 \text{ m/s}$

13) $\lambda_1 = 400 \cdot 10^{-9} \text{ m}$ $\lambda_2 = 800 \cdot 10^{-9} \text{ m}$ $v_L = 3 \cdot 10^8 \text{ m/s}$ $f_1 = \frac{v_L}{\lambda_1} = \frac{3 \cdot 10^8 \text{ m/s}}{400 \cdot 10^{-9} \text{ m}} = 7,5 \cdot 10^{14} \text{ Hz}$

14) $v_L = 3 \cdot 10^8 \text{ m/s}$ $f = 50 \text{ Hz}$ $600\,000\,0$
 $v = \lambda \cdot f \Rightarrow \lambda = \frac{v_L}{f} = \frac{3 \cdot 10^8 \text{ m/s}}{50 \text{ Hz}} = \underline{\underline{6\,000\,000 \text{ m}}}$

12b) $f = \frac{1}{T} = \frac{1}{960125} = 0.00104145 \text{ Hz}$

$\omega = 2\pi \cdot f = 2\pi \cdot 0.00104145 \text{ Hz} = \underline{\underline{0.00654 \cdot s^{-1}}}$