150/1

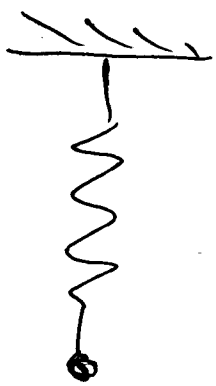
$f = 440\,Hz$

$T = ?$

$$T = \frac{1}{f}$$

$$T = \frac{1}{440} \doteq \underline{0{,}002\ s}$$

150/2



90 kmitů / minutu

= 1,5 kmitu / s

$\Rightarrow f\,[Hz] = \underline{1{,}5\ Hz}$

$f = 90\ min^{-1}$

$T = ?\ ,\ f\,[Hz] = ?$

$$T = \frac{1}{f} = \frac{1}{1{,}5} = \underline{0{,}67\ s}$$

154/2

$y = 0{,}3 \text{ cm } \sin 4\pi s^{-1} \cdot t$

$y_m = ?\ ,\ \omega t = ?\ ,\ \omega = ?\ ,\ f = ?\ ,\ T = ?$

$y = y_m \sin(\omega t) \Rightarrow y_m = \underline{0{,}3 \text{ cm}}$

$\omega t = \underline{4\pi s^{-1} t}$ $\qquad \omega = \frac{2\pi}{T} \equiv 2\pi f$

$\omega = 4\pi s^{-1} \Rightarrow \quad 4\pi = 2\pi f$

$f = \frac{4\pi}{2\pi} = \underline{2 \text{ Hz}}$

$T = \frac{1}{f} = \frac{1}{2} = \underline{0{,}5 \text{ s}}$

154/3

$f = 0{,}5\ Hz$

$y_m = 5\ cm$

$t = 0{,}25 \cdot j\ 0{,}5 \cdot j\ 1 \cdot$

$y = y_m \sin(\omega t) \qquad \omega = 2\pi f$

$\omega = 2\pi\, 0{,}5 \doteq 3{,}14\ s^{-1}$

$y_1 = 0{,}05 \cdot \sin(3{,}14 \cdot 0{,}25)$

JEDNOTKY V RADIÁNECH → PŘEVEDEME NA STUPNĚ

$2\pi\ rad = 360° \Rightarrow 1\ rad = \frac{360}{2\pi}$

$y_1 = 0{,}05 \cdot \sin\left(\frac{360(3{,}14 \cdot 0{,}25)}{2\pi}\right)$

$y_1 = 0{,}03534\ m \equiv 3{,}54\ cm$

$y_2 = 0{,}05 \cdot \sin\left(\frac{360\,(3{,}14 \cdot 0{,}5)}{2\pi}\right)$

$y_2 = 0{,}05\ m \equiv 5\ cm$

$y_3 = 0{,}05 \sin\left(\frac{360\,(3{,}14 \cdot 1)}{2\pi}\right)$

$y_3 = 0\ m \equiv 0\ cm$

156/1

$l = 4\ m$

$g = 9{,}81\ m s^{-2}$

$T = 2\pi \sqrt{\frac{l}{g}}$

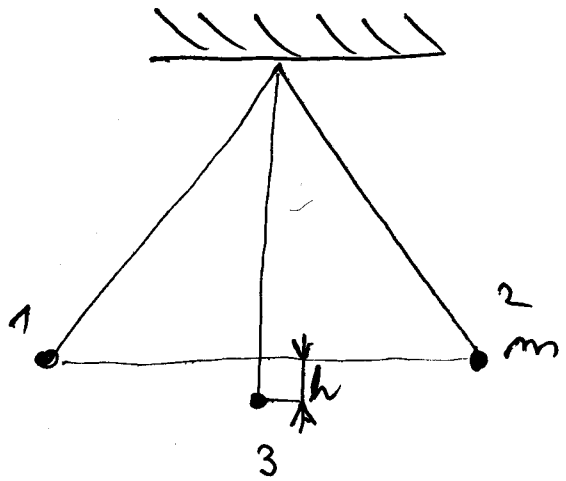
$T = 2\pi \sqrt{\frac{4}{9{,}81}} = \underline{4{,}012\ s}$

156/3

$m = 100\ g$

$h = 1{,}25\ cm$

$v = ?\ ,\ E_k\ ,\ E_p = ?$



Platí ZZE

Poloha 1 a 2 – maximální E_p , $E_k = 0$

Poloha 3 – maximální E_k , $E_p = 0$

$E_k = E_p$

$E_p = m g h$

$E_k = \frac{1}{2} m v^2$

$\Rightarrow v = \sqrt{2gh} = \sqrt{2\ 9{,}81 . 0{,}0125} = \underline{0{,}495\ m s^{-1}}$

Rovnovážná poloha – bod 3

$E_p = 0\ J$

$E_k = \frac{1}{2} m v^2 = \frac{1}{2}\ 0{,}100 . 0{,}495^2 = \underline{0{,}012\ J}$

160/1

$\lambda = 1\ m$

$v = 340\ m\,s^{-1}$ $\qquad v = \frac{\lambda}{T}$

$$T = \frac{\lambda}{v} = \frac{1}{340} \doteq 0{,}003\ s^{-1}$$

160/2

$f = 4\,000\ Hz$

$v = 5000\ m\,s^{-1}$

$\lambda = ?$ $\qquad v = \frac{\lambda}{T}$ $\qquad T = \frac{1}{f}$

$v = \lambda . f$

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

$$\lambda = \frac{5000}{4000} = 1{,}25\ m$$

160/3

$f = 50\ MHz$

$v = 3.10^8\ m\,s^{-1}$

$\lambda = ?$

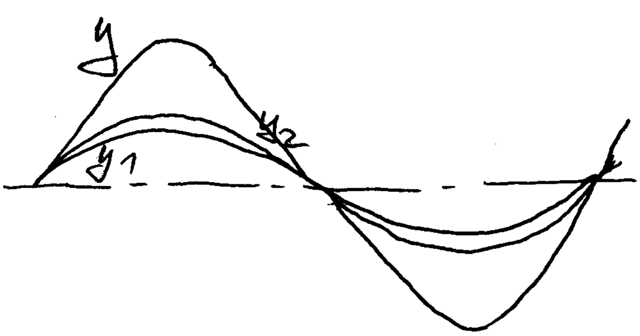
$$v = \lambda . f \Rightarrow \lambda = \frac{v}{f} = \frac{3.10^8}{50.10^6} = 6\ m$$

163/2

$y_1 = 3$ cm

$y_2 = 2$ cm

a) Stejná fáze

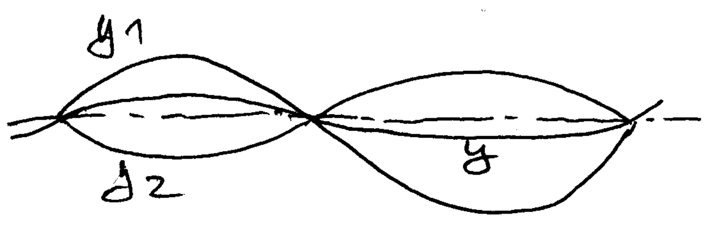


$y = y_1 + y_2$

$y = 3 + 2$

$y = \underline{5 \text{ cm}}$

b) Opačná fáze



$y = y_1 + y_2$

$y = 3 - 2$

$y = 1$ cm

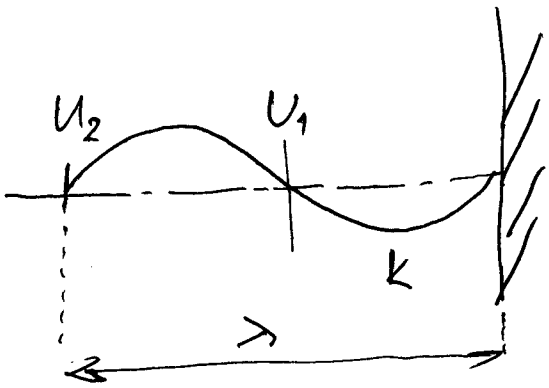
163/3

$f = 440\ Hz$

$v = 340\ m\,s^{-1}$

$$v = \frac{\lambda}{T} \equiv \lambda \cdot f$$

$$\lambda = \frac{v}{f} = \frac{340}{440} = 0{,}77\ m$$



U - uzel $= \frac{\lambda}{2}$

k - kmitna $= \frac{\lambda}{4}$

$$U = \frac{0{,}77}{2} \doteq 39\ cm$$

$$k = \frac{0{,}77}{4} \doteq 19{,}3\ cm$$

166/1

$f_1 = 16\ Hz$

$f_2 = 20\ kHz$

$v = 340\ m\,s^{-1}$

$\lambda_1, \lambda_2 = ?$

$v = \lambda f$

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

$$\lambda_1 = \frac{340}{16} = 21{,}25\ m$$

$$\lambda_2 = \frac{340}{20 \cdot 10^3} = 0{,}017\ m$$

166/2

$t = 12\ 0$

$t = 20\,°C$

$l = ?$

$v_0 = 331{,}5\ m\,s^{-1}$ při $t = 0\,°C$

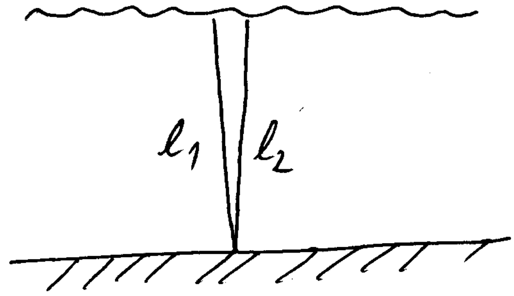
$v = v_0 + 0{,}6\ m\,s^{-1}\,K^{-1} \cdot t$

$v = 331{,}5 + 0{,}6 \cdot 25$

$v = 346{,}5\ m\,s^{-1}$

$l = v \cdot t = 346{,}5 \cdot 12 = 4158\ m$

$t = 4\,s$



$l_1 = l_2$

$v = \frac{s}{t} \Rightarrow s = v \cdot t \; ; \; l_1 + l_2 = s$

v zvuku ve vodě je dle MFCHT $\doteq 1500\, m s^{-1}$

$s = 1500 \cdot 4 = \underline{6\,000\, m}$

$s = l_1 + l_2 \Rightarrow l_1 = \frac{s}{2}$ $\qquad l_1 = l_2 \equiv l$

$l = \frac{6000}{2} \doteq \underline{\underline{3000\, m}}$