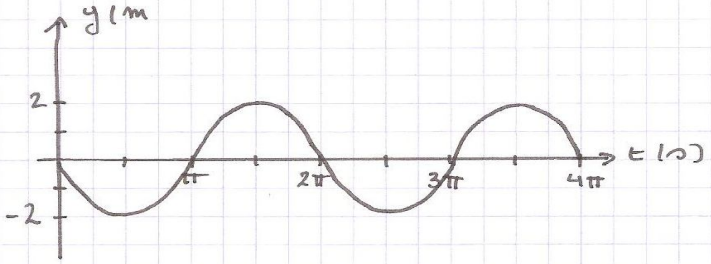
6ème Physique 2h : Solutions des exercices de révision.

ex 1 : 1500 tours → 1 min = 60 s
1 tour → 0,04 s = T ⇒ f = 25 Hz

ex 2 : a) A = 2 m ω = 1 rad/s φ = −π

b) $\omega = \frac{2\pi}{T} = 1 \Rightarrow T = 2\pi$ s $f = \frac{1}{2\pi}$ Hz



ex 3 : A = 0,02 m
T = 10 s
φ = π

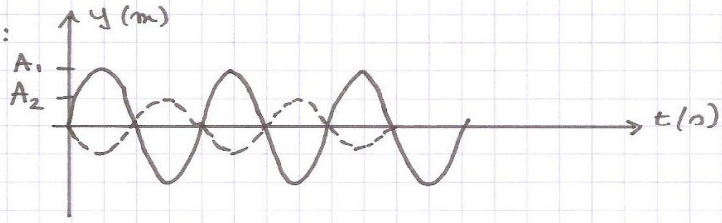
$y(t) = 0{,}02 \sin\left(\frac{2\pi}{10} t + \pi\right)$

ex 4 : a) A = 0,03 m
T = 10 s
f = 0,1 Hz
φ = 0

b) $y(1) = 0{,}03 \sin\left(\frac{2\pi}{10} \cdot 1\right) = 0{,}017$ m
$y(16) = 0{,}03 \sin\left(\frac{2\pi}{10} \cdot 16\right) = -0{,}017$ m
$y(24) = 0{,}03 \sin\left(\frac{2\pi}{10} \cdot 24\right) = 0{,}017$ m

(x)

ex 5 :



ex 6 : a) $v(t) = A\omega \cos(\omega t + \varphi) = 0{,}02 \cdot \frac{\pi}{8} \cdot \cos\left(\frac{\pi}{8} \cdot t + 3\right)$

b) $a(t) = -A\omega^2 \sin(\omega t + \varphi) = -\frac{\pi^2}{64} \cdot 0{,}02 \cdot \sin\left(\frac{\pi}{8} t + 3\right)$

$v(2) = -0{,}00628$ m/s $a(2) = 0{,}00185$ m/s²

ex 7 : $1 = 2\pi\sqrt{\frac{\ell}{g}} \iff \frac{1}{4\pi^2} \cdot 9{,}81 = \ell = 0{,}25$ m

ex 8 : 15 tours → 4,65 s k ?

1 tour → 0,31 s $T = 2\pi\sqrt{\frac{m}{k}}$ $k = 49,29\ N/m$.

ex 9 : $F = 0,054\ N$, $\Delta x = 0,06\ m$, $m = 0,240\ kg$

$k = \frac{F}{\Delta x} = 0,9\ N/m$

$T = 2\pi\sqrt{\frac{m}{k}} = 2,48\ s$

$f = 0,403\ Hz$

ex 10 : $v = 2\ m/s$ $A = 0,1\ m$ $T = 0,25\ s$

a) $\lambda = v \cdot T = 0,5\ m$

b) $\Delta x = 1,2\ m$ $\Delta t = \frac{\Delta x}{v} = 0,6\ s$

$v = 2\ m/s$

c) $y(t) = 0,1 \cdot \sin\left(\frac{2\pi}{0,25} \cdot t\right) = 0,1 \cdot \sin(8\pi t)$

d) $y(t) = 0,1 \sin\left(\frac{2\pi}{0,25}(t - 0,6)\right) = 0,1 \sin(8\pi(t - 0,6))$

e) $v(t) = 0,1 \cdot \frac{2\pi}{0,25} \cdot \cos(8\pi(t - 0,6))$

$= 0,1 \cdot 8\pi \cdot \cos(8\pi(t - 0,6))$

f) $a(t) = -A\omega^2 \sin(\omega(t - \frac{d}{v}))$

$= -0,1\ 64\pi^2 \sin(8\pi(t - 0,6))$

g) $v_{max} = 0,1 \cdot 8\pi = 2,51\ m/s$

$a_{max} = 0,1 \cdot 64\pi^2 = 63,16\ m/s^2$

ex 11 : a) P est situé à 2m, il est occupé de descendre.

b) $\lambda = 2\ m$

c) Q est à 3m, son élongation sera égale à 2m 1/4 de T plus tard.

d) $\lambda = 2\ m$ $v = 3\ m/s$

$\lambda = v \cdot T \Leftrightarrow T = \frac{2}{3}\ s$ $f = \frac{3}{2}\ Hz$

M est à 6m N à 6,75m max : 1,25m

$\Delta t = \frac{\Delta x}{v} = 0,42\ s$

ex12 : $\beta = 80\,dB = 10 \cdot \log \frac{I}{10^{-12}}$

$8 = \log \frac{I}{10^{-12}}$

$\log 10^8 = \log \frac{I}{10^{-12}}$ $\quad I = 10^8 \cdot 10^{-12}$

$I = 10^{-4}\,W/m^2$

a) $I = 10^{-4} - 0{,}9 \cdot 10^{-4} = 1 \cdot 10^{-5}\,W/m^2$

$\beta = 10 \cdot \log \frac{10^{-5}}{10^{-12}} = 70\,dB$

(ou) divisé par 10 $\Rightarrow -10\,dB$.

b) $I = \frac{10^{-4}}{2} = 5 \cdot 10^{-5}\,W/m^2$

$\beta = 10 \cdot \log \frac{5 \cdot 10^{-5}}{10^{-12}} = 76{,}99\,dB$

(ou) divisé par 2 $\Rightarrow -3\,dB$.

ex13 : $60 = 10 \cdot \log \frac{I}{10^{-12}}$

a) $\log 10^6 = \log \frac{I}{10^{-12}}$ $\quad I = 10^{-6}\,W/m^2$ $\quad$ b) $I = 4 \cdot 10^{-6}\,W/m^2$

c) $60\,dB \xrightarrow{+3} 63\,dB \xrightarrow{+3} 66\,dB = 10 \cdot \log 4 \cdot \frac{10^{-6}}{10^{-12}}$

1 $\xrightarrow{\times 2}$ 2 $\xrightarrow{\times 2}$ 4

ex14 : $83\,dB \xrightarrow{-10} 73\,dB \xrightarrow{-10} 63\,dB \xrightarrow{-10} 53\,dB$

$I_1 \xrightarrow{:10} \xrightarrow{:10} \xrightarrow{:10}$ $\Rightarrow$ reste $\frac{1}{1000}$

ex15 : $f = 1000\,Hz$

$v = 40\,km/h = 11{,}11\,m/s$

$f' = \frac{1000}{1 - \frac{11{,}11}{340}} = 1033{,}43\,Hz$

ex16 : $f = 440\,Hz$ $v = 100\,km/h = 27{,}77\,m/s$

$c = 330\,m/s$

a) $\lambda = \frac{v}{f}$! vitesse de l'onde ! $= 0{,}75\,m$

b) $f' = \frac{440}{1 - \frac{27{,}77}{330}} = 480{,}44\,Hz$

$\lambda' = \frac{v}{f'} = 0{,}69\,m$

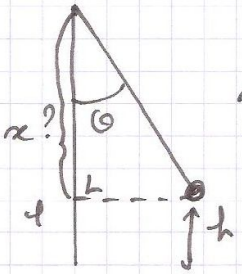
c) $f' = \frac{440}{1 + \frac{27{,}77}{330}} = 405{,}84\,Hz$

$\lambda' = \frac{v}{f'} = 0{,}81\,m$

ex17 : $m = 0{,}045\,kg$

! en degré ! $L = 1\,m$

$\theta = 45°$



$x = L \cdot \cos\theta$

a) $h = L - x$

$h = L - L\cos\theta$

$h = L(1 - \cos\theta) \Rightarrow E_p = mgh = mgL(1 - \cos\theta)$

b) $E_p = mgL(1 - \cos\theta) = 0{,}045 \cdot 9{,}81 \cdot (1 - \cos 45°)$

à 45° $= 0{,}129\,J = \frac{m \cdot v^2}{2}$ à 0°

$v = \sqrt{\frac{2 \cdot 0{,}129}{0{,}045}} = 2{,}397\,m/s$

c) si $\theta = 30°$ $E_p = 0{,}059\,J \Rightarrow E_c = 0{,}129 - 0{,}059$

$= 0{,}070\,J$

$v = \sqrt{\frac{2 \cdot 0{,}070}{0{,}045}} = 1{,}76\,m/s$

ex18 a) $F = 0{,}2 \cdot 9{,}81 = 1{,}96\,N$; $\Delta x = 0{,}14\,m$; a) $F = k \cdot \Delta x$; $k = \frac{F}{\Delta x} = 14\,N/m$

b) $F = 0{,}5 \cdot 9{,}81 = 4{,}9\,N$; $k = 14\,N/m$; $\Delta x = \frac{F}{k} = 0{,}35\,m$.