Formules *Ondes et physique moderne*

$x = A\sin(\omega t + \varphi)$	$\frac{d^2x}{dt^2} + \omega^2 x = 0$
$\omega = \sqrt{\frac{k}{m}}$	$\omega = \sqrt{\frac{g}{l}}$
$E = \frac{1}{2}mv^2 + \frac{1}{2}kx^2 = \frac{1}{2}kA^2$	
$\omega = 2\pi f = \frac{2\pi}{T}$	$f_{batt} = \lvert f_1 - f_2 \rvert$
$y = A\sin(kx \mp \omega t + \varphi)$	
$v = \sqrt{\frac{F}{\mu}}$	$v = f\lambda =$
$f_n = \frac{nv}{2l}$	$f_n = \frac{nv}{4l}$
$f' = \left(\frac{v \pm v_0}{v \mp v_s}\right) f$	$I = \frac{P}{A} = \frac{P}{4\pi r^2}$
$\beta = 10 \log \frac{I}{I_0}$	$n = \frac{c}{v}$
$n_1 \sin\theta_1 = n_2 \sin\theta_2$	$\lambda_n =$
$\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$	$f = \frac{R}{2}$
$m = \frac{y_i}{y_0} = \frac{-q}{p}$	$\frac{n_1}{p} + \frac{n_2}{q} = \frac{n_2 - n_1}{R}$
$\frac{1}{f} = \frac{n_2 - n_1}{n_1}\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$	$G = \frac{\beta}{\alpha}$
$G = -\frac{q_{obj}}{p_{obj}} \times \frac{0{,}25}{p_{oc}}$	$G = \frac{0{,}25}{p}$
$P = \frac{1}{f}$	$G = -\frac{f_{obj}}{p_{oc}}$
$P_{acc} = \frac{1}{d_{PP}} - \frac{1}{d_{PR}}$	$\delta = d \sin\theta$
$\delta = m\lambda$	$\delta = (m + ½)\,\lambda$
$\frac{\phi}{2\pi} = \frac{\delta}{\lambda}$	$d\sin\theta = m\lambda$
$I = 4I_0 \cos^2\frac{\phi}{2}$	$a \sin\theta = m\lambda$
$I = I_{max}\frac{\sin^2\frac{\alpha}{2}}{\left(\frac{\alpha}{2}\right)^2}$	$\alpha = \frac{2\pi a \sin\theta}{\lambda}$
$R = \frac{\lambda}{\Delta\lambda} = Nm$	$\theta_c = \frac{1{,}22\lambda}{a}$
$I = I_0 \cos^2\theta$	$E = nhf$
$K_{max} = e\Delta V_0$	$hf_0 = \phi$
$K_{max} = hf - \phi$	$hf = E_{n'} - E_n$
$mvr = n\hbar$	$E_n = -\frac{13{,}6}{n^2}\,eV$
$E_l = [Zm_H + Nm_n - m_x]c^2$	
$\frac{dN}{dt} = -\lambda N$	$N = N_0 e^{-\lambda t}$
$T_{\frac{1}{2}} = \frac{0{,}693}{\lambda}$	$R = \lambda N$

Constantes utiles

$e = 1{,}6 \times 10^{-19}$ C	$k = 9 \times 10^9$ N.m²/C²
$h = 6{,}626 \times 10^{-34}\, J \bullet s$	$R = 1{,}09737 \times 10^7\, m^{-1}$
$\varepsilon_0 = 8{,}85 \times 10^{-12}$ C²/N.m²	1eV = $1{,}6 \times 10^{-19}$ J
$\mu_0 = 4\pi \times 10^{-7}$ T.m/A	$N_A = 6{,}022 \times 10^{23}$ mol^{-1}
$m_{proton} = 1{,}67264 \times 10^{-27}$ kg = 938,28 MeV/c^2	
$m_{neutron} = 1{,}6750 \times 10^{-27}$ kg = 939,57 MeV /c^2	
$m_{élec.} = 9{,}109 \times 10^{-31}$ kg = 0,511 MeV/c^2	
1 u = 1,660 54 x 10^{-27} kg = 931,5 Mev/c^2	

Formules de mécanique classique

$\vec{v} = \vec{v}_0 + \vec{a}t$	$v^2 = v_0^2 + 2\vec{a}\cdot(\vec{r} - \vec{r}_0)$
$\vec{r} = \vec{r}_0 + \vec{v}_0 t + \frac{1}{2}\vec{a}t^2$	$\sum \vec{F} = m\vec{a}$
$F_{cent} = \frac{mv^2}{R}$	$K = \frac{1}{2}mv^2$

Intégrales

$$\int dx = x$$

$$\int au\, dx = a\int u dx$$

$$\int (u + v) dx = \int u dx + \int v dx$$

$$\int u \frac{dv}{dx} dx = uv - \int v \frac{du}{dx} dx$$

$$\int x^m dx = \frac{x^{m+1}}{m+1} \quad (m \neq -1)$$

$$\int e^x dx = e^x$$

$$\int \frac{dx}{x} = \ln|x|$$

$$\int \frac{dx}{(a + bx)^2} = -\frac{1}{b(a + bx)}$$

$$\int \sin x dx = -\cos x$$

$$\int \cos x\, dx = \sin x$$

$$\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \ln\left(x + \sqrt{x^2 \pm a^2}\right)$$

Identités trigonométriques

$$\sin\theta = \sin(\pi - \theta)$$

$$\cos\theta = \cos(-\theta)$$

$$\sin A \pm \sin B = 2\sin\frac{1}{2}(A \pm B)\cos\frac{1}{2}(A \mp B)$$

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$