

Équations importantes du tome A (Modifications apportées par Simon Vézina)

$\Delta x = x - x_0$ $\vec{s} = \Delta \vec{r} = \vec{r} - \vec{r}_0$
$\bar{v}_x = \frac{\Delta x}{\Delta t} \quad \bar{v} = \frac{\Delta \vec{r}}{\Delta t} = \frac{\vec{s}}{\Delta t}$ $v_x = \lim_{\Delta t \rightarrow 0} \frac{\Delta x}{\Delta t} = \frac{dx}{dt}$ $\vec{v} = \lim_{\Delta t \rightarrow 0} \frac{\Delta \vec{r}}{\Delta t} = \frac{d\vec{r}}{dt}$
$\bar{a}_x = \frac{\Delta v_x}{\Delta t} \quad \bar{a} = \frac{\Delta \vec{v}}{\Delta t}$ $a_x = \lim_{\Delta t \rightarrow 0} \frac{\Delta v_x}{\Delta t} = \frac{dv_x}{dt}$ $\vec{a} = \lim_{\Delta t \rightarrow 0} \frac{\Delta \vec{v}}{\Delta t} = \frac{d\vec{v}}{dt}$
$VSM = \frac{DP}{\Delta t}$
$v_{xAR} = v_{xAB} + v_{xBR}$ $\vec{v}_{AR} = \vec{v}_{AB} + \vec{v}_{BR}$ $v_{xAB} = -v_{xBA}$ $\vec{v}_{AB} = -\vec{v}_{BA}$
$v_x = v_{x0} + a_x t$ $x = x_0 + v_{x0} t + \frac{1}{2} a_x t^2$ $x = x_0 + \left(\frac{v_{x0} + v_x}{2} \right) t$ $v_x^2 = v_{x0}^2 + 2a_x(x - x_0)$
$T = \frac{2\pi r}{v} \quad f = \frac{1}{T}$
$a_c = \frac{v^2}{r}$

$\sum \vec{F} = m\vec{a}$ $\vec{F}_{A \text{ sur } B} = -\vec{F}_{B \text{ sur } A}$
$F_g = \frac{Gm_1 m_2}{r^2}$ $\vec{F}_g = m\vec{g} \quad g = \frac{Gm}{r^2}$
$\rho = \frac{m}{V}$

$F_r = k e \quad e = L - L_{nat}$
$f_c = \mu_c n \quad 0 \leq f_s \leq \mu_s n$
$F_A = \rho_f V g$
$P = \frac{F}{A} \quad P_B = P_S + \rho g h$ $\tilde{P} = P - P_{atm}$

$W = \vec{F} \cdot \vec{s} \quad W = F s \cos \theta_{Fs}$ $W = F_x \Delta x + F_y \Delta y + F_z \Delta z$
$K = \frac{1}{2} m v^2$ $K_f = K_i + W_{tot} \quad \Delta K = W_{tot}$
$U_r = \frac{1}{2} k e^2$

$U_g = mgy \quad \Delta U_g = mg\Delta y$ $U_g = -\frac{Gm_1 m_2}{r}$

$E = K + U$ $E_f = E_i + W_{nc} \quad \Delta E = W_{nc}$
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$W_c = -\Delta U \quad F_x = -\frac{dU}{dx}$
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$v_{lib} = \sqrt{\frac{2Gm}{r}}$

$\bar{P} = \frac{\Delta(\text{énergie})}{\Delta t} \quad \bar{P} = \frac{W}{\Delta t}$ $P = \vec{F} \cdot \vec{v} \quad P = Fv \cos \theta_{Fv}$
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$Q = mc\Delta T$ $Q = mL_f \quad Q = mL_v$
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$\vec{p} = m\vec{v} \quad \sum \vec{p}_f = \sum \vec{p}_i$ $\sum \vec{F} = \frac{d\vec{p}}{dt}$ $\sum \vec{F}_{ext} = 0 \rightarrow \sum \vec{p} = \text{constante}$
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$v_{xBf} - v_{xAf} = -(v_{xBi} - v_{xAi})$
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$\vec{J} = \Delta \vec{p} \quad \vec{J} = \sum \vec{F} \Delta t$ $\vec{p}_f = \vec{p}_i + \vec{J}_{ext}$
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$\omega = \frac{d\theta}{dt} \quad \alpha = \frac{d\omega}{dt}$
$\omega = \omega_0 + \alpha t$ $\theta = \theta_0 + \omega_0 t + \frac{1}{2} \alpha t^2$ $\theta = \theta_0 + \left(\frac{\omega_0 + \omega}{2} \right) t$ $\omega^2 = \omega_0^2 + 2\alpha(\theta - \theta_0)$

$x = r\theta \quad v_x = r\omega \quad a_x = r\alpha$

$a_c = r\omega^2$

$\tau = \pm r F_{\perp} = \pm r F \sin \phi$ $\vec{\tau} = \vec{r} \times \vec{F}$
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$\sum \vec{F} = 0 \quad \sum \tau = 0$
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$\vec{r}_{CM} = \frac{\sum m_i \vec{r}_i}{\sum m_i}$
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$I = mr^2 \quad I = \int r^2 dm$ $I = mh^2 + I_{CM}$
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Cylindre : $I_{CM} = \frac{1}{2} mR^2$ Sphère : $I_{CM} = \frac{2}{5} mR^2$ Coquille : $I_{CM} = \frac{2}{3} mR^2$
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Tige (centre) : $I_{CM} = \frac{1}{12} mL^2$ Tige (extrémité) : $I = \frac{1}{3} mL^2$

$K = \frac{1}{2} I \omega^2$ $K = \frac{1}{2} I_{CM} \omega^2 + \frac{1}{2} m v_{CM}^2$

$W = \tau \Delta \theta \quad P = \tau \omega$
$\sum \tau = I\alpha \quad \sum \vec{\tau} = I\vec{\alpha}$

$L = I\omega \quad \vec{L} = I\vec{\omega}$ $\vec{L} = \vec{r} \times \vec{p} \quad \sum \vec{\tau} = \frac{d\vec{L}}{dt}$ $\sum \vec{\tau}_{ext} = 0 \rightarrow \sum \vec{L} = \text{constante}$
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$g = 9,8 \text{ m/s}^2$ $G = 6,67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$ $1 \text{ hp} = 746 \text{ W}$ $P_{atm} = 101,3 \text{ kPa}$ $1 \text{ mmHg} = 133,3 \text{ Pa}$ $1 \text{ cal} = 4,19 \text{ J}$ $T(\text{K}) = T(^{\circ}\text{C}) + 273,15$
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$ax^2 + bx + c = 0$ $\rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
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$C = 2\pi r \quad A = \pi r^2$

$A = 4\pi r^2 \quad V = \frac{4}{3} \pi r^3$
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$(1+x)^n \approx 1+nx \quad (x \ll 1)$ $\sin \theta \approx \tan \theta \approx \theta \quad (\theta \ll 1 \text{ rad})$
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$ A_{opp} = A \sin \phi$ $ A_{adj} = A \cos \phi$ $\phi = \arctan \left \frac{A_{opp}}{A_{adj}} \right $ $A = \sqrt{A_{adj}^2 + A_{opp}^2}$
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$\frac{\sin \alpha}{A} = \frac{\sin \beta}{B} = \frac{\sin \gamma}{C}$ $C^2 = A^2 + B^2 - 2AB \cos \gamma$
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$\sin^2 \theta + \cos^2 \theta = 1$ $\sin 2\theta = 2 \sin \theta \cos \theta$
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$\vec{A} \cdot \vec{B} = AB \cos \theta_{AB}$ $\vec{A} \cdot \vec{B} = A_x B_x + A_y B_y + A_z B_z$ $\ \vec{A} \times \vec{B}\ = AB \sin \theta_{AB}$
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$\frac{d}{dx} x^A = A x^{A-1}$ $\frac{d}{dx} e^{Ax} = A e^{Ax}$ $\frac{d}{dx} \ln(Ax) = \frac{1}{x}$ $\frac{d}{dx} \sin(Ax) = A \cos(Ax)$ $\frac{d}{dx} \cos(Ax) = -A \sin(Ax)$
