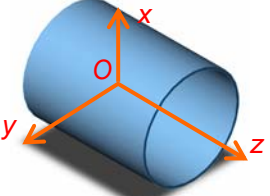
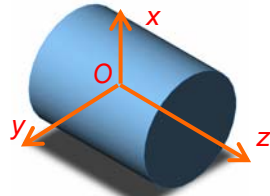
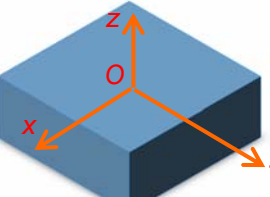
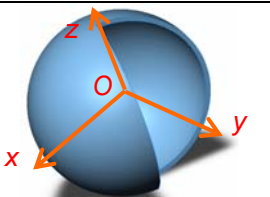
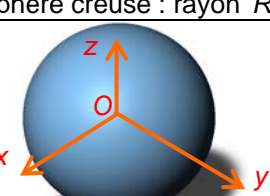
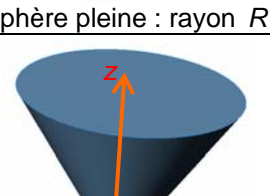
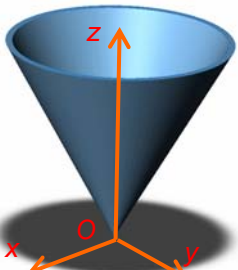
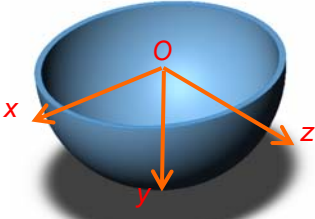
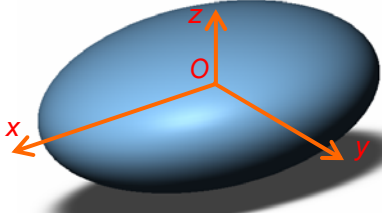
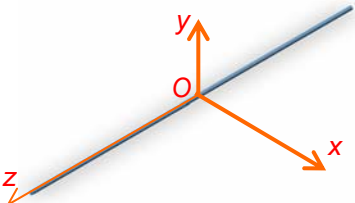
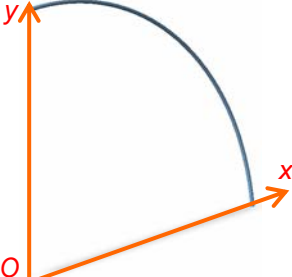
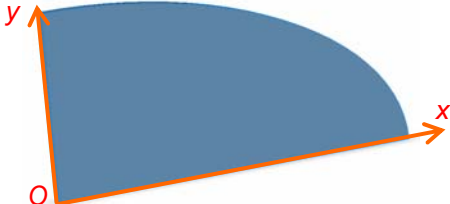
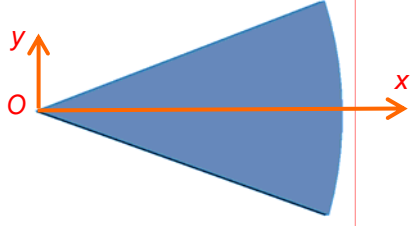
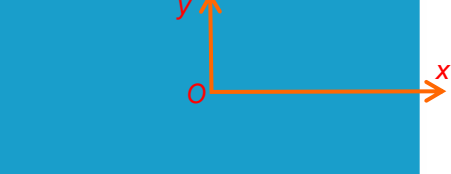
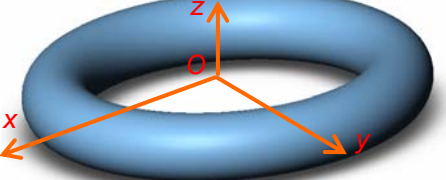
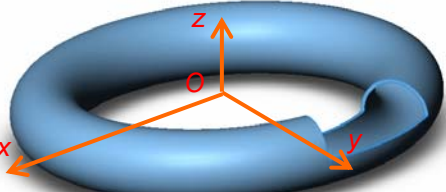


Géométrie des masses de solides homogènes

Corps homogène de masse m	Centre d'inertie	Matrice d'inertie en $(O, \vec{x}, \vec{y}, \vec{z})$
 <p>cylindre creux : rayon R et longueur l</p>	centre	$\begin{pmatrix} \frac{1}{2}mR^2 + \frac{1}{12}ml^2 & 0 & 0 \\ 0 & \frac{1}{2}mR^2 + \frac{1}{12}ml^2 & 0 \\ 0 & 0 & mR^2 \end{pmatrix}$
 <p>cylindre plein : rayon R et longueur l</p>	centre	$\begin{pmatrix} \frac{1}{4}mR^2 + \frac{1}{12}ml^2 & 0 & 0 \\ 0 & \frac{1}{4}mR^2 + \frac{1}{12}ml^2 & 0 \\ 0 & 0 & \frac{1}{2}mR^2 \end{pmatrix}$
 <p>parallélépipède rectangle : coté a, b, c</p>	centre	$\begin{pmatrix} \frac{1}{12}m(b^2 + c^2) & 0 & 0 \\ 0 & \frac{1}{12}m(a^2 + c^2) & 0 \\ 0 & 0 & \frac{1}{12}m(a^2 + b^2) \end{pmatrix}$
 <p>sphère creuse : rayon R</p>	centre	$\begin{pmatrix} \frac{2}{3}mR^2 & 0 & 0 \\ 0 & \frac{2}{3}mR^2 & 0 \\ 0 & 0 & \frac{2}{3}mR^2 \end{pmatrix}$
 <p>sphère pleine : rayon R</p>	centre	$\begin{pmatrix} \frac{2}{5}mR^2 & 0 & 0 \\ 0 & \frac{2}{5}mR^2 & 0 \\ 0 & 0 & \frac{2}{5}mR^2 \end{pmatrix}$
 <p>cône plein : rayon R, hauteur h</p>	$z_c = \frac{3h}{4}$	$\begin{pmatrix} \frac{3m}{5} \left(\frac{R^2}{4} + h^2 \right) & 0 & 0 \\ 0 & \frac{3m}{5} \left(\frac{R^2}{4} + h^2 \right) & 0 \\ 0 & 0 & \frac{3m}{5} \frac{R^2}{2} \end{pmatrix}$

Corps homogène de masse m	Centre d'inertie	Matrice d'inertie
 <p>cône creux : rayon R, hauteur h</p>	$z_c = \frac{2h}{3}$	$\begin{pmatrix} \frac{1}{4}mR^2 + \frac{1}{2}mh^2 & 0 & 0 \\ 0 & \frac{1}{4}mR^2 + \frac{1}{2}mh^2 & 0 \\ 0 & 0 & \frac{1}{2}mR^2 \end{pmatrix}$
 <p>demi sphère creuse : rayon R</p>	$z_c = \frac{R}{2}$	$\begin{pmatrix} \frac{2}{3}mR^2 & 0 & 0 \\ 0 & \frac{2}{3}mR^2 & 0 \\ 0 & 0 & \frac{2}{3}mR^2 \end{pmatrix}$
 <p>ellipsoïde : axes $2a$, $2b$, $2c$</p>	<p>centre</p>	$\begin{pmatrix} \frac{1}{3}m(b^2 + c^2) & 0 & 0 \\ 0 & \frac{1}{3}m(a^2 + c^2) & 0 \\ 0 & 0 & \frac{1}{3}m(a^2 + b^2) \end{pmatrix}$
 <p>tige rectiligne : longueur $2a$</p>	<p>centre</p>	$\begin{pmatrix} \frac{1}{3}ma^2 & 0 & 0 \\ 0 & \frac{1}{3}ma^2 & 0 \\ 0 & 0 & 0 \end{pmatrix}$
 <p>quart de cercle : rayon R</p>	$x_c = y_c = \frac{2R}{\pi}$	$\begin{pmatrix} \frac{1}{2}mR^2 & \frac{1}{\pi}mR^2 & 0 \\ \frac{1}{\pi}mR^2 & \frac{1}{2}mR^2 & 0 \\ 0 & 0 & mR^2 \end{pmatrix}$
 <p>quart de plaque elliptique : demi-axes a, b</p>	$x_c = \frac{4a}{3\pi}$ $y_c = \frac{4b}{3\pi}$	$\begin{pmatrix} \frac{1}{4}mb^2 & \frac{1}{2\pi}mab & 0 \\ \frac{1}{2\pi}mab & \frac{1}{4}ma^2 & 0 \\ 0 & 0 & \frac{1}{4}m(a+b)^2 \end{pmatrix}$

Corps homogène de masse m	Centre d'inertie	Matrice d'inertie
 <p>secteur circulaire : rayon R</p>	$x_C = \frac{2}{3} R \frac{\sin \alpha}{\alpha}$	$\begin{pmatrix} \frac{1}{4} m R^2 \left(1 - \frac{\sin 2\alpha}{2\alpha} \right) & 0 & 0 \\ 0 & \frac{1}{4} m R^2 \left(1 + \frac{\sin 2\alpha}{2\alpha} \right) & 0 \\ 0 & 0 & \frac{1}{2} m R^2 \end{pmatrix}$
 <p>rectangle : a et b</p>	centre	$\begin{pmatrix} \frac{4}{3} m b^2 & 0 & 0 \\ 0 & \frac{4}{3} m a^2 & 0 \\ 0 & 0 & \frac{4}{3} m (a^2 + b^2) \end{pmatrix}$
 <p>tore plein : rayons R et a</p>	centre	$\begin{pmatrix} m \left(\frac{a^2}{2} + \frac{5R^2}{8} \right) & 0 & 0 \\ 0 & m \left(\frac{a^2}{2} + \frac{5R^2}{8} \right) & 0 \\ 0 & 0 & m \left(a^2 + \frac{3R^2}{4} \right) \end{pmatrix}$
 <p>tore creux : rayons R et a</p>	centre	$\begin{pmatrix} m \left(\frac{a^2}{2} + \frac{5R^2}{4} \right) & 0 & 0 \\ 0 & m \left(\frac{a^2}{2} + \frac{5R^2}{4} \right) & 0 \\ 0 & 0 & m \left(a^2 + \frac{3R^2}{2} \right) \end{pmatrix}$